DOCUMENT RESUME

ED 252 683 CE 040 465

TITLE	Industrial Arts 7-9. Graphic Communications. Drafting. Graphic Arts.
INSTITUTION	Manitoba Dept. of Education, Winnipeg.
REPORT NO	ISBN-0-86497-125-7
PUB DATE	83
NOTE	504p.; For related documents, see CE 040 464-466 and CE 040 478. Replacement of earlier teacher's guide (1969).
PUB TYPE	Guides - Classroom Use - Guides (For Teachers) (052)
EDRS PRICE	MF02/PC21 Plus Postage.
DESCRIPTORS	Behavioral Objectives; Curriculum Guides; Design; *Drafting; Foreign Countries; *Graphic Arts; *Industrial Arts; Junior High Schools; Learning Activities; Learning Modules; Orthographic Projection; Printing; Program Design; Program Implementation; Safety
IDENTIFIERS	*Graphic Communication

ABSTRACT

This guide for industrial arts grades 7-9 provides teachers with a curriculum for the subject cluster of graphic communications. An "Overview" section presents the rationale, discusses how the content of the program is related to the developmental stages of the adolescent, describes the structure of the industrial arts program, and lists program goals and objectives. The "Implementation" section covers program design, scope and sequence, time allotment, integration, selection of materials, evaluation, and students with special needs. The graphic communications subject cluster has three areas of study and includes 13 core modules for drafting, 14 core and 3 optional modules for graphic arts, and 19 core and 3 optional modules for graphic communications. Each module includes a major objective, estimated time, and student objectives with corresponding suggested activities and notes and suggested resources. Three modules common to all three areas of study are student orientation, safety, and careers. Other modules cover measurement, planning and design, consumerism, sketching, mechanics of drawing, pictorial drawing, orthographic drawing, drawing interpretation, drawing reproduction, electronic systems, screen process, relief printing, photography, and office graphic arts equipment. A bibliography is appended. (YLB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED252683

industrial arts 7-9

graphic communications

drafting
graphic arts
graphic communications

MANITOBA DEPARTMENT OF EDUCATION

1983

CE040465

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)

☒ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

● Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

KACosens

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

approved by
the minister of education

ISBN 0-86497-125-7

These guides for the Industrial Arts 7-9 subject clusters (Construction, Graphic Communications, Power/Energy, and Manufacturing) replace the 1969 Industrial Arts Teacher's Guide for grades seven, eight and nine; and the interim guides for Construction, Graphic Communications, Power/Energy, and Manufacturing issued in 1976. They have been developed as part of the overall revision of the industrial arts programs for the junior high schools of Manitoba. They are based on recommendations included in the Report of the Home Economics and Industrial Arts Task Force of 1978 and Education for the Middle Years, a 1977 position paper of the Middle Years Program Review Committee, as well as suggestions from junior high school and community college teachers.

Industrial Arts 7-9: Construction, Graphic Communications, Power/Energy, and Manufacturing (1983) become the approved provincial guides for industrial arts in the junior high school, effective the fall of 1983.

ACKNOWLEDGEMENTS

Members of the Industrial Arts 7-9 Curriculum Committee:

James Patterson (Chairperson)
Chief Peguis Junior High School
River East School Division No. 9

Robert Barton
Carberry Collegiate
Beautiful Plains School Division No. 31

Brian Bean
Nelson McIntyre Collegiate
Norwood School Division No. 8

Leon Beauchamp
Elmwood High School
Winnipeg School Division No. 1

Stanley Bogucki
Teacher Education Division
Red River Community College

Robert Cordingley
Glenlawn Collegiate
St. Vital School Division No. 6

Rex Czusdi
Nellie McClung Collegiate
Pembina Valley School Division No. 27

Hendrik Douwes
Selkirk Junior High School
Lord Selkirk School Division No. 11

Edward Eisener
Westdale Junior High School
Assiniboine South School Division No. 3

Robert Johnson
Harrison Junior High School
Brandon School Division No. 40

Luther Judt
Teacher Education Division
Red River Community College

Russell Kubara (Chairperson)
St. John's High School
Winnipeg School Division No. 1

Ed Kustra
St. John's High School
Winnipeg School Division No. 1

John Lord
Stonewall Collegiate
Interlake School Division No. 21

David McClelland
Neepawa Area Collegiate
Beautiful Plains School Division No. 31

Dennis MacTavish
Bernie Wolfe Community School
Transcona-Springfield School Division No. 12

Walter Opalko
Daniel McIntyre Collegiate
Winnipeg School Division No. 1

Alphonse Ostermann
Jefferson Junior High School
Seven Oaks School Division No. 10

Lawrence Oystryk
River East Collegiate
River East School Division No. 9

Gary Schneilert
Souris Collegiate
Souris Valley School Division No. 42

Rick Stepaniuk
Fort Richmond Collegiate
Fort Garry School Division No. 5

Donald Thiessen
Carman Collegiate
Midland School Division No. 25

Abram Wiebe
Steinbach Junior High School
Hanover School Division No. 15

Consultants to the Committee:

Isabella Dryden
and
Gene Happychuk
Curriculum Development and Implementation Branch
Department of Education

CONTENTS

OVERVIEW 3

- Introduction 3
- Rationale 3
- The Developmental Stages of Adolescents . . . 4
- Structure of the Program 7
- Program Goals 11
- Program Objectives 11

IMPLEMENTATION 31

- Program Design 31
- Scope and Sequence 32
- Time Allotment 33
- Integration 33
- Selection of Materials 33
- Evaluation 34
- Students with Special Needs 35

COMMON MODULES 39

DRAFTING 63

GRAPHIC ARTS 119

GRAPHIC COMMUNICATIONS 199

BIBLIOGRAPHY 245

overview

OVERVIEW

INTRODUCTION

The junior high school industrial arts curriculum has been revised to reflect the philosophy of the Middle Years Program Review Committee, and to provide objectives and learning experiences which will enable students to maximize their effectiveness as individuals within the family, business, and community. The focus is on the well-being of individuals, groups, and businesses/industries, the environmental qualities which affect that well-being, and on how individuals and industry in turn affect the environment.

The Middle Years Program Review Committee and the Home Economics and Industrial Arts Task Force have recommended that the curriculum:

1. de-emphasize sex bias in roles and expectations normally assigned to home economics and industrial arts programs;
2. minimize the sequencing of courses to enable students to participate in a wide variety of learning experiences, by providing an exploratory program, particularly at the introductory level.

A combined home economics/industrial arts exploratory program, at the introductory level, will be available.

The curriculum also reflects the effects of a rapidly changing society, awareness of many forms of industry and industrial processes, and social and technological changes which influence life styles and business/industry.

This guide should assist teachers in meeting students' physical, social, emotional, and intellectual needs through the emphases on the continuing responsibilities of individuals and groups, and on the processes by which decisions are made and action is taken. This guide provides student objectives, suggested activities, notes, and resources to assist teachers in planning programs related to their students and community.

RATIONALE

The study of industrial arts in the junior high school program in Manitoba is designed to help students clarify values, set personal goals, and acquire skills for improving the quality of life for individuals and groups in business, industry, community, and society.

Industrial arts has much to contribute to the growth and development of students in the middle years and to the curriculum of the middle years school. Industrial arts helps emerging and early adolescents in their search for identity and development of self-concept; encourages the development of such basic skills as learning how to learn and making decisions; encourages the development of skills in personal and family life and in business and industrial processes; explores possible career choices in industrial-arts related areas; and provides opportunities for students to discover new interests, growing capacities and the need for effective use and control of resources and technologies.

The study of industrial arts will enable students to:

1. Appreciate the interdependence of the individual, the family, and groups in business/industry and society, and understand the factors in society, business/industry, and the community which assist individuals in meeting basic needs.

2. Understand the influences which affect decision-making and realize that one can use natural and industrial resources effectively in making choices which are satisfying and accountable to self, family, groups, business/industry, and community.

3. Identify values and priorities in life and consider the quality of life as much as the quantity of production and consumption.

4. Understand the ways in which an individual, alone or as part of a group, can increase opportunities to achieve potential and satisfaction in life.

5. Appreciate good craftsmanship and design, both in the products of modern industry and in artifacts from past cultures.

6. Understand the necessity to adjust and adapt in a world of change.

7. Develop knowledge and skills to improve human relations and to meet present and future needs of society.

8. Appreciate the interdependence and the importance of practicing the management skills of planning, organizing, and controlling work.

9. Develop critical thinking related to materials, tools, and processes of industry, and creative expression related to industrial materials.

10. Recognize the importance of safety in the use and maintenance of tools, energy, equipment, and materials appropriate to various technologies in a productive society.

11. Develop positive attitudes towards safety, conservation, ecology, and technology.

12. Recognize consumer rights and responsibilities relating to self and to various types of industries.

13. Understand and recognize the vocations and general occupational characteristics of various types of industries.

14. Recognize the relationship of personal interests, abilities, preferences, and values to various career areas.

THE DEVELOPMENTAL STAGES OF ADOLESCENTS

The content of the industrial arts programs is closely related to adolescent developmental stages. The adolescent years are a period of transition, and within this period, students' development varies widely.

An outline of typical characteristics of junior high students has been used as a guide in creating, adapting, and suggesting learning experiences. Characteristics of adolescents may be described under the headings: cognitive, physical, emotional, social, and moral. All aspects of development are interconnected.

ADOLESCENT NEEDS	CHARACTERISTICS	APPROPRIATE ACTIVIVITIES
Cognitive: Develop intellectual activity which is logical and abstract, with thinking becoming more mobile, flexible and less egocentric.	Interested primarily in self, but gradually developing greater interest in the outside world and in family problems.	Begin with interests and concerns, then proceed to family, community and society. The 12-year-old is concerned with lack of resources. Begin with this problem and proceed to a discussion of family resources, then to resources in industries and in the community.
Physical: Develop one's physique and use the body effectively.	A physical age with tremendous variations.	Discuss the roles of the individual, family, and business in meeting physical needs.
	Growth makes demands on energy.	Emphasize nutritious foods for growth and development required to learn and work effectively.
	Growth affects self-concept.	Encourage participation in projects to promote personal satisfaction and creativity.
	Concern with awkwardness and physical appearance.	Identify and discuss factors which affect personal appearance and safety in a work environment.
	Experience difficulty in carrying out long-range projects. May be restless with short attention span.	Provide variety in content and methods. Work on projects that can be completed in a short period of time or completed in sections. Encourage active participation in learning.

ADOLESCENT NEEDS	CHARACTERISTICS	APPROPRIATE ACTIVITIES
Emotional: Emotional needs are closely linked to physical needs.	Variable and intense.	Help students recognize that changes in their development affect behavior.
	Great stresses and contrasts.	
	Need to come to terms with emotions.	
	Inclined to be enthusiastic and often impulsive.	Create an atmosphere for tapping enthusiasm and impulse with techniques such as brainstorming, ad lib skits, word association, self-chosen projects and assignments.
Achieve emotional independence of parents and other adults.	Seeking identity.	Encourage students to identify individual strengths that lead to a greater understanding and acceptance of self.
Social: Desire and achieve socially responsible behavior.	Relationship with peers important.	Contrast activities and relationships with peers and family.
	Group oriented, but conflict between group and individuality.	Provide opportunities to work individually and in groups.
	Increasing maturity.	Help students to appreciate that each person is different physically and mentally, possessing characteristics which make one worthy of acceptance.
	Rise of sexuality and relationships with opposite sex.	

ADOLESCENT NEEDS	CHARACTERISTICS	APPROPRIATE ACTIVITIES
Moral: Acquire a set of values and an ethical system as a guide to behavior.	Live primarily in the present, now rather than tomorrow, but gradually growing more concerned with immediate and distant future. Social and intellectual development have important consequences for moral growth. Make personal evaluations. Begin to formulate own moral code. Less inclined to accept parental values. Begin to put self in another's place.	Build on present interests and concerns.

STRUCTURE OF THE PROGRAM

The Industrial Arts curriculum for grades seven, eight, and nine is divided into subject clusters, areas of study, and modules, rather than by grade designation. The division and the depth of content and objectives for each area of study in each grade level, will depend upon laboratories available, the time allotment, and the organization of the program in a school. Curriculum content proceeds from the establishment of basic understanding and skills at the introductory level, to a more intensive study and understanding at subsequent levels.

There are four subject clusters: Construction, Graphic Communications, Power/Energy, Manufacturing. Each subject cluster contains areas of study. Construction has one area of study: Construction; Graphic Communications has three areas of study: Drafting, Graphic Arts, Graphic Communications; Power/Energy has three areas of study: Electricity/Electronics, Power Mechanics, Power/Energy; and Manufacturing has four areas of study: Metalwork, Plastics, Woodwork, and Manufacturing. Each area of study is comprised of core modules (C) or core and optional (O) modules. Three of the core modules, Student Orientation, Safety and Careers, are common to all areas of study.

The subject cluster for Construction comprises 16 core and 5 optional modules.

Construction

- I Student Orientation (C)
- II Safety (C)
- III Careers (C)
- IV Measurement (C)
- V Planning and Design (C)
- VI Consumerism (C)
- VII Site Selection (C)
- VIII Materials (C)
- IX Separation (C)
- X Fastening (C)
- XI Footings and Foundations (C)
- XII Floors (C)
- XIII Walls and Partitions (C)
- XIV Roofs (C)
- XV Enclosing (C)
- XVI Energy and Insulation (C)
- XVII Exterior Finish (O)
- XVIII Interior Finish and Trim (O)
- XIX Plumbing System (O)
- XX Electricity (O)
- XXI Landscaping (O)

The Graphic Communications subject cluster includes 13 core modules for Drafting, 14 core and 3 optional modules for Graphic Arts, and 19 core and 3 optional modules for Graphic Communications.

	Drafting	Graphic Arts	Graphic Communications
I	Student Orientation (C)	Student Orientation (C)	Student Orientation (C)
II	Safety (C)	Safety (C)	Safety (C)
III	Careers (C)	Careers (C)	Careers (C)
IV	Measurement (C)	Measurement (C)	Measurement (C)
V	Planning and Design (C)	Planning and Design (C)	Planning and Design (C)
VI	Consumerism (C)	Consumerism (C)	Consumerism (C)
VII	Sketching (C)	Design Concepts (C)	Sketching (C)
VIII	Mechanics of Drawing (C)	Screen Process (C)	Mechanics of Drawing (C)
IX	Pictorial Drawing (C)	Relief Printing (C)	Pictorial Drawing (C)
X	Orthographic Drawing (C)	Black and White Photography (C)	Orthographic Drawing (C)
XI	Drawing Interpretation (C)	Process Photography (C)	Drawing Interpretation (C)
XII	Drawing Reproduction (C)	Planographic Printing (C)	Design Concepts (C)
XIII	Electronic Systems (C)	Intaglio Printing (C)	Screen Process (C)
XIV		Packaging and Presentation (C)	Relief Printing (C)

	Drafting	Graphic Arts	Graphic Communications
XV		Color Photography (O)	Black and White Photography (C)
XVI		Office Graphic Arts Equipment (O)	Process Photography (C)
XVII		Electronic Systems (O)	Planographic Printing (C)
XVIII			Intaglio Printing (C)
XIX			Packaging and Presentation (C)
XX			Color Photography (O)
XXI			Office Graphic Arts Equipment (O)
XXII			Electronic Systems (O)

The Power/Energy subject cluster includes 13 core modules for Electricity/Electronics, 11 core modules for Power Mechanics, and 11 core modules for Power/Energy.

	Electricity/Electronics	Power Mechanics	Power/Energy
I	Student Orientation (C)	Student Orientation (C)	Student Orientation (C)
II	Safety (C)	Safety (C)	Safety (C)
III	Careers (C)	Careers (C)	Careers (C)
IV	Measurement (C)	Measurement (C)	Measurement (C)
V	Planning and Design (C)	Planning and Design (C)	Planning and Design (C)
VI	Consumerism (C)	Consumerism (C)	Consumerism (C)
VII	Components (C)	Tools and Fasteners (C)	Tools and Fasteners (C)
VIII	Tools and Fasteners (C)	Energy Sources (C)	Energy Sources (C)
IX	Energy Sources (C)	Energy Conversion (C)	Energy Conversion (C)
X	Energy Conversion (C)	Transmission of Power (C)	Transmission of Power and Energy (C)
XI	Energy Transmission (C)	Routine Care and Maintenance (C)	Power Systems (C)
XII	Energy Systems (C)		
XIII	Electrical Wiring (C)		

The Manufacturing subject cluster includes 15 core modules for Metalwork, 14 core modules for Plastics, 14 core modules for Woodwork, and 15 core modules for Manufacturing.

	Metalwork	Plastics	Woodwork	Manufacturing
I	Student Orientation (C)	Student Orientation (C)	Student Orientation (C)	Student Orientation (C)
II	Safety (C)	Safety (C)	Safety (C)	Safety (C)
III	Careers (C)	Careers (C)	Careers (C)	Careers (C)
IV	Measurement (C)	Measurement (C)	Measurement (C)	Measurement (C)
V	Design and Construction (C)	Design and Construction (C)	Design and Construction (C)	Design and Construction (C)
VI	Consumerism (C)	Consumerism (C)	Consumerism (C)	Consumerism (C)
VII	Materials (C)	Materials (C)	Materials (C)	Materials (C)
VIII	Separation (C)	Separation (C)	Separation (C)	Separation (C)
IX	Forming (C)	Forming (C)	Forming (C)	Forming (C)
X	Conditioning (C)	Fastening (C)	Fastening (C)	Conditioning (C)
XI	Fastening (C)	Finishing (C)	Finishing (C)	Fastening (C)
XII	Finishing (C)	Jigs and Fixtures (C)	Jigs and Fixtures (C)	Finishing (C)
XIII	Jigs and Fixtures (C)	Mass Production (C)	Mass Production (C)	Jigs and Fixtures (C)
XIV	Mass Production (C)	Enterprise System (C)	Enterprise System (C)	Mass Production (C)
XV	Enterprise System (C)			Enterprise System (C)

Each of the modules for the 11 areas of study includes the following:

1. Major objectives accompany each module and provide an overview of what the student should achieve through the study of the module.

2. Student objectives are related to topics and are sequenced to lead to an understanding of the major objective. The objectives are based on students' needs and average abilities. Learning one objective leads to insight into how to proceed to the next objective, and, eventually, to the understanding of the major objective and the topics. If students are aware of the objectives, they may identify with them more closely and aim to achieve them.

3. Suggested activities and notes are designed to help students achieve objectives. These experiences help the students to acquire knowledge, learn skills, evaluate attitudes and values, and develop understanding, appreciation, and perception of topics and objectives. The learning experiences and activities should be added to and updated continually by the teacher and the students.

4. Resources are suggested to assist the teachers and the students in developing and understanding the topics, objectives, and learning experiences. The resources should be added to and updated continually by the teacher and the students.

PROGRAM GOALS

The general goals of the junior high industrial arts program are to assist students to:

. acquire an understanding of self.
. understand how personal, business, industrial, and societal needs are met through positive interrelationships.
. develop skills to meet needs in the home, in the community, and in business and industry.
. develop a high degree of safety consciousness.
. acquire basic skills in the use of common industrial tools, machines, and processes.
. become increasingly questioning, creative, and critical consumers of natural and industrial resources and accept responsibilities for decisions made.
. develop problem-solving and creative abilities involving materials, processes, and products of industry.
. become involved in energy-saving, ecology, conservation, and technological studies and activities.
. develop confidence, high standards of performance, and a sense of pride in achievement.
. discover and develop talents, aptitudes, interests, and potential in technical fields and applied sciences.
. acquire basic skills and knowledge related to materials and technical procedures.
. gain an insight into various types of industries and their relationship to individuals, communities, society, and economic systems and conditions.
. develop creative potential, both avocationally and vocationally.
. achieve a degree of competency that leads to further education, training, and employment.
. acquire an understanding of the relationship between technological advances, requirements of industry, careers, and economic conditions.
. develop skills to make choices leading toward the attainment of a better quality of life.

PROGRAM OBJECTIVES

The classifications of educational objectives--psychomotor, affective, and cognitive--have a relationship to each other. Frequently, at least two, if not all three, types of learning occur simultaneously. The teacher may choose to concentrate on one objective at a time or to correlate two or more objectives. It is possible to incorporate all three types of objectives as components of behavior or action. The student may be developing a skill and at the same time acquiring an attitude or value as well as a knowledge of principles related to the skill.

MAJOR OBJECTIVES: DRAFTING

The Drafting program is designed to aid beginning students to explore many facets of the language of industry and to gain an understanding of its relationship to self, people, careers, consumerism, industry, economics, and technology. Drafting is studied to develop understanding and basic skills in the selection, use and care of materials and tools; and techniques and processes related to planning, expressing, communicating, and interpreting ideas. The development of these can lead to participation in practical, creative, and satisfying learning experiences; to the application of learning experiences to future educational, vocational, and life skills; and to appreciation of high standards of workmanship and craftmanship.

The student should be able to:

. Explore and relate the significance of industrial arts to the needs of individuals, industry, and society.
. Develop a high degree of safety consciousness, practice, and application in the use of tools, equipment, and processes through a wide range of exploratory experiences as they relate to individuals and to the production and services aspects of hobbies and industries.

- Gain information about the general occupational characteristics of a variety of career fields and to match interests, abilities, preferences, and values to characteristics of various careers.
- Gain knowledge and skills related to imperial and SI metric systems of measurement and drafting scales.
- Gain an understanding of the relationship of planning and design to drafting and to develop skills in planning and design.
- Explore and relate the complexity of the economy to drafting and consumer awareness.
- Recognize the significance of, to gain knowledge about, and to explore skills, techniques, and applications pertinent to freehand sketching for drafting.
- Obtain knowledge about drafting tools and materials; to develop skills in their use; and to apply knowledge and drafting techniques to lines, dimensioning, and hand lettering.
- Recognize the significance of and acquire related knowledge of pictorial drawing, and to develop related drafting skills.
- Explore the purpose of and to develop understanding and drafting skills in sectional views, auxiliary views, and pattern development, applicable to orthographic drawing.
- Recognize the significance of drawing interpretation and to apply the process to manufacturing, construction, and assembly drawings.
- Gain an understanding and appreciation of the skills and processes related to the reproduction of drawings.
- Gain an understanding and appreciation of the influence on drafting of the functions of computers and computer-directed devices.

MAJOR OBJECTIVES: GRAPHIC ARTS

This area of study is designed to introduce students to the world of graphic arts. Beginning students will explore many facets of the science, art, and processes of printing and the allied crafts related to printing and publishing; and to acquire understanding of the relationship of graphic arts to self, people, careers, consumerism, industry, economics, and technology. Graphic Arts is studied to develop understanding and basic skills in selection, use and care of materials, tools, and equipment, and in the techniques and processes related to designing, production, and distribution of graphic arts products and services. The development of these can lead to participation in practical, creative, and satisfying learning experiences; to the application of learning experiences to future and present educational, vocational, avocational, and life skills; and to appreciation of high standards of workmanship and craftmanship.

The student should be able to:

- Explore and relate the significance of industrial arts to the needs of individuals, industry, and society.
- Develop a high degree of safety consciousness, practice, and application in the use of tools, equipment, and processes, through a wide range of exploratory experiences as they relate to individuals and to the production and services aspects of hobbies and industries.
- Gain information about the general occupational characteristics of a variety of career fields and to match interests, abilities, preferences, and values to characteristics of various careers.
- Gain knowledge and skills related to imperial and SI metric systems of measurement, and to the point system and line gauges pertinent to the processes of graphic arts.
- Acquire an understanding of the relationship of planning and design to graphic arts; and to develop skills in planning and design.
- Explore and to relate the complexity of the economic system and the economy to graphic arts and consumer awareness.

- Recognize the importance of design factors, design elements, design principles, pre-printed and photo composition; and to use all these design concepts in the preparation of layouts for printing processes.
- Recognize the significance of screen-process printing and to develop skills and knowledge related to preparing and using hand-cut paper and film stencils, and indirect and direct photographic stencils in screen-process printing.
- Explore the development and purpose of relief printing; to gain knowledge and skills, and to participate in experiences related to the graphic arts processes of relief printing.
- Recognize the function and principles of black and white photography; to acquire knowledge; and to explore skills, techniques, and applications of black and white photography in graphic arts processes.
- Gain knowledge about the significance of process photography; to acquire skills and techniques to apply process photography to graphic arts procedures.
- Recognize the development, significance, and principles of planographic printing; to gain knowledge about and to explore and apply the skills pertinent to plate preparation, press operation and maintenance for the lithographic processes.
- Acquire knowledge of the development, importance and principles of intaglio printing; to acquire knowledge and explore the skills related to plate preparation for the intaglio printing process.
- Recognize the significance of, to gain knowledge about, and to explore skills pertinent to finishing, binding, packaging, and distributing processes for graphic arts.
- Explore the significance of color photography; to acquire knowledge and to develop skills related to color photography, applicable to graphic arts processes.
- Acquire an understanding and an appreciation of the development, processes, and skills related to office graphic arts equipment.
- Acquire understanding and appreciation of the influence and functions of computers and computer-directed devices on graphic arts processes.

MAJOR OBJECTIVES: GRAPHIC COMMUNICATIONS

This area of study is designed to introduce students to the processes of communicating graphically; to aid beginning students to explore the art, processes, and techniques related to graphic messages; and to gain understanding of the relationship to self, people, careers, consumerism, industry, economics, and technology. Graphic Communications is studied to develop understanding and basic skills in selection, use and care of materials, tools, and equipment, and in the techniques and processes of using symbols, photographs, drawings, and other printed images to design, compose, reproduce, and transmit graphic messages. The development of these can lead to participation in practical, creative, and satisfying learning experiences; to the application of learning experiences to future and present educational, vocational, avocational, and life skills; and to appreciation of high standards of workmanship and craftmanship.

The student should be able to:

- Explore the significance of industrial arts and to relate it to the needs of individuals, industry, and society.
- Develop a high degree of safety consciousness, practice and application in the use of tools, equipment, and processes, through a wide range of exploratory experiences as they relate to individuals and to production and servicing aspects of hobbies and industries.
- Gain information about the general occupational characteristics of a variety of career fields and to match interests, abilities, preferences, and values to characteristics of various careers.
- Gain knowledge and skills related to imperial and SI

metric systems of measurement, and to the point system, line gauges, and drafting scales pertinent to the various products of graphic communications.

- Acquire an understanding of the relationship of planning and design to graphic communications, and to develop basic skills in planning and designing the messages and products of graphic communications.
- Explore and to relate the complexity of the economic system and the economy to graphic communications and consumer awareness.
- Gain knowledge about and to explore skills, techniques, and applications of freehand sketching for graphic communications.
- Obtain knowledge and to develop skills in the use of drafting tools and materials; and to apply knowledge and drafting techniques to lines, dimensioning, and hand lettering for graphic communications.
- Explore the significance of and to develop knowledge and drafting skills related to pictorial drawing for communicating graphically.
- Explore the purpose of and to develop understanding and drafting skills in sectional and auxiliary views and pattern development, applicable to orthographic drawing for communicating graphically.
- Recognize the significance of drawing interpretation and to apply the process to manufacturing, construction, assembly, and layout drawings for communicating graphic messages.
- Recognize the importance of design factors, design elements and principles, pre-printed and photo composition; and to incorporate these design concepts into the layouts for printed messages.
- Determine the significance of screen-process printing; and to develop skills and knowledge related to preparing and using hand-cut paper and film stencils, indirect and direct photographic stencils in screen-process printing for communicating messages graphically.
- Explore the development and purpose of relief printing; to gain knowledge and skills, and to participate in experiences related to relief printing for communicating graphically.
- Recognize the function and principles of black and white photography; to acquire knowledge about the skills, techniques, and applications of black and white photography for graphic communications.
- Gain knowledge about the significance of process photography; to acquire skills and techniques; and to apply process photography to communicating graphically.
- Recognize the development, significance, and principles of planographic printing; to acquire knowledge and explore skills pertinent to plate preparation and press operation for communicating graphically by the lithographic processes.
- Determine the development, importance, and principles of intaglio printing; and to acquire knowledge and explore skills related to plate preparation pertinent to communicating messages graphically.
- Recognize the significance of packaging and presentation; to gain knowledge and explore skills and techniques pertinent to finishing, binding, packaging, and distributing processes for communicating graphically.
- Explore the significance of color photography and to acquire knowledge and skills in color photography to communicate graphically.
- Gain an understanding and an appreciation of the developments, processes, and skills related to office equipment for communicating graphically.
- Acquire an understanding and an appreciation of the influence and functions of computers and computer-directed devices on planning, designing, and communicating messages graphically.

OBJECTIVES: COMMON MODULES FOR ALL AREAS OF STUDY

I. Student Orientation (C)

The student should be able to:

- define Industrial Arts;
- develop an understanding of the role of industrial arts;
- recognize the relationship between junior high school and senior high school industrial arts;
- develop an understanding about the avocational and vocational activities and interests in industrial arts;
- list the subject clusters for junior high school industrial arts;
- identify the areas of study for each of the subject clusters;
- develop an awareness of the modules for each of the areas of study;
- develop an awareness of the industrial arts program in the local school division/school;
- identify reference materials;
- develop the ability to use reference materials;
- identify community resources.

II. Safety (C)

The student should be able to:

- understand the need for and the importance of safety;
- identify and follow safe behavior;
- identify and explain the symbols denoting hazards;
- accept responsibility for developing safety habits;
- explain the causes and effects of common industrial accidents;
- demonstrate a knowledge of the organization of the industrial arts laboratory;
- recognize the relationship of laboratory layout to safety;
- recognize the potential hazards of tools, equipment, machines, and materials;
- explain the purpose of proper storage of tools, equipment, and materials;
- explain the need for and the importance of safe clothing;
- wear clothing appropriate for industrial arts laboratories;
- understand the need for and the importance of protective devices;
- use protective devices when required;
- describe daily procedures to be followed in industrial arts laboratories;
- identify and accept responsibility for housekeeping practices;
- identify emergency procedures;
- practice and use emergency procedures.

III. Careers (C)

The student should be able to:

- develop an awareness of the major groups of occupations;
- collect information about careers related to the major groups of occupations;
- identify careers related to the areas in the industrial arts program;
- develop an awareness of the major groups of occupations;
- identify skills required for specific jobs;
- identify personal interests, abilities, and needs;
- recognize the relationship of attitudes to working conditions;
- identify realistic educational and training plans for specific occupational areas;
- recognize the impact of technology on careers;

- explain the influence of social and economic trends on careers;
- identify the ways in which jobs are advertised;
- understand the purposes of a job description;
- explain the need for a resumé, an application, and an interview.

OBJECTIVES: DRAFTING MODULES

I. Student Orientation (C)

II. Safety (C)

III. Careers (C)

IV. Measurement (C)

The student should be able to:

- define measurement;
- explain the importance of and the need for measurement;
- recognize the need for standards;
- define scale;
- recognize the need for scales in technical drawing;
- identify the scales used in technical drawing;
- use drafting scales;
- explain the term SI;
- identify the basic units of measurement;
- understand the applications of SI metric and imperial units of measurement used in drafting;
- use the SI metric system of measurement.

V. Planning and Design (C)

The student should be able to:

- define drafting;
- explain the purpose and the importance of drafting;
- define planning;
- develop an understanding of the importance of planning;
- identify the components of planning;
- recognize the fundamentals of design;
- explain the relationship of design to strength, function, appearance, materials, cost, and quality;
- identify the steps in the design process.

VI. Consumerism (C)

The student should be able to:

- define economic system;
- explain the basic parts of economic systems;
- identify basic types of inputs;
- identify human needs;
- explain how drafting meets human needs;
- recognize the relationship between drafting and the economy;
- differentiate between needs and wants;
- recognize the concept of quality versus cost;
- explain the role of supply and demand;
- describe the effects of inflation;
- identify the positive and negative aspects of credit buying;
- recognize the importance of the services and the products of drafting;
- collect information and examples of specialized types of drafting;
- explain the relationship between drafting and advertising.

VII. Sketching (C)

The student should be able to:

- define sketching;
- describe the purposes of sketching;
- recognize the applications of sketching to industry and society;
- understand the need for using sequential steps in developing freehand sketching skills;
- recognize and use basic factors of freehand sketching;
- develop techniques for sketching lines and shapes;
- identify the reasons for lettering;
- develop techniques for lettering;
- identify the types of views;
- sketch one-view and two-view drawings;
- describe the procedure for enlarging and reducing sketches;
- use the graph method to enlarge and reduce sketches.

VIII. Mechanics of Drawing (C)

The student should be able to:

- recognize the importance of drafting tools;
- identify the various types of drafting tools;
- use drafting tools;
- identify drawing materials;
- select and use the proper paper and related materials for drafting projects;
- draw basic lines;
- explain line conventions;
- draw the various lines classified as the alphabet of lines;
- recognize the importance of and the need for dimensioning;
- read dimensions;
- dimension the overall measurements and features on the drawing of an object;
- recognize the importance of and the need for neat, legible, accurate, and standardized lettering;
- use lettering on drawings;

IX. Pictorial Drawing (C)

The student should be able to:

- recognize the purposes of pictorial drawings;
- identify the three most used types of pictorial drawings;
- describe isometric drawings;
- construct simple isometric drawings;
- define oblique drawing;
- identify the two forms of an oblique drawing;
- draw a simple oblique view of an object;
- explain the purpose of perspective drawings;
- identify the types of perspective drawings;
- construct simple perspective drawings.

X. Orthographic Drawing (C)

The student should be able to:

- recognize the purpose of orthographic drawings;
- draw top, front, and right-side views of an object;
- position the views according to the rules for orthographic projection;
- understand the need for sectional views;
- draw sectional views;
- describe the function of auxiliary views;
- draw auxiliary views;
- explain the purpose of patterns and pattern development;
- recognize the use of pattern development;
- prepare patterns for regular solids.

XI. Drawing Interpretation (C)

The student should be able to:

- recognize conventions related to manufacturing drawings;
- apply drawing conventions to reading and interpreting manufacturing drawings;
- recognize conventions related to construction drawings;
- read a simple floor plan for a house;
- recognize conventions related to assembly drawings;
- read and interpret assembly drawings.

XII. Drawing Reproduction (C)

The student should be able to:

- describe the need for reproduction of drawings;
- recognize the importance of drawing preparation;
- identify the methods of reproducing drawings;
- explain the principles of the various methods of reproducing drawings;
- reproduce original drawings.

XIII. Electronic Systems (C)

The student should be able to:

- explain the importance of the computer to drafting processes;
- recognize the relationship of the computer to the drafter;
- identify computer-directed drawing devices;
- explain the purpose of the devices;
- explain the drafting functions of digitizers, plotters, and CRT video display units.

OBJECTIVES: GRAPHIC ARTS MODULES

I. Student Orientation (C)

II. Safety (C)

III. Careers (C)

IV. Measurement (C)

The student should be able to:

- define measurement;
- explain the importance of and the need for measurement;
- recognize the need for standards;
- identify the measurement systems for graphic arts;
- explain the point system;
- use a line gauge.

V. Planning and Design (C)

The student should be able to:

- define graphic arts;
- explain the purpose and the importance of graphic arts;
- define planning;
- develop an understanding of the importance of planning;
- identify the components of planning;
- recognize the fundamentals of design;
- explain the relationship of design to strength, function, appearance, materials, cost, and quality;
- identify the steps in the design process.

VI. Consumerism (C)

The student should be able to:

. define economic system;
. explain the basic parts of economic systems;
. identify basic types of inputs;
. identify human needs;
. explain how graphic arts meet human needs;
. recognize the relationship between graphic arts and the economy;
. differentiate between needs and wants;
. recognize the concept of quality versus cost;
. explain the role of supply and demand;
. describe the effects of inflation;
. identify the positive and negative aspects of credit buying;
. recognize the importance of graphic arts processes in preparing printed materials;
. collect information and examples of advertisements;
. explain the relationship between graphic arts and advertising.

VII. Design Concepts (C)

The student should be able to:

. define design;
. describe the purposes of graphic design;
. identify design factors;
. identify the elements of design;
. explain the purpose of the elements of design;
. use the elements of design;
. identify the principles of design;
. describe the purposes of the principles of design;
. use the principles of design;
. describe the function of layout;
. identify types of layout;
. describe the characteristics of the types of layout;
. produce the various types of layouts;
. identify the various types of pre-printed aids;
. describe the use of photographs in layouts;
. prepare layouts using pre-printed and/or photo composition.

VIII. Screen-Process Printing (C)

The student should be able to:

. outline the historical development of screen-process printing;
. identify modern applications of screen-process printing;
. identify various types of stencils used in screen-process printing;
. list the basic steps involved in cutting paper stencils;
. cut paper stencils;
. print copies from a hand-cut paper stencil;
. identify the types of hand-cut film stencils;
. cut film stencils;
. print copies from a hand-cut film stencil;
. identify the types of photographic stencils;
. explain the indirect photographic stencil method;
. expose and develop an indirect photographic stencil;
. print copies of an indirect photographic stencil;
. explain the direct photographic stencil method;
. expose and develop a direct photographic stencil;
. print copies from a direct photographic stencil;
. describe the multicolored screen-printing process;
. prepare a design of two or more colors;

- prepare separate stencils for multicolor screen-printing of designs;
- print copies of stencils for multicolor designs;
- demonstrate the understanding of the concept of vacuum screen-printing;
- operate a vacuum screen-printer.

IX. Relief Printing (C)

The student should be able to:

- define relief printing;
- outline the history of relief printing;
- explain the principle of relief printing;
- describe the function of a magnetic sign press;
- lay out type for a magnetic sign press;
- operate a magnetic sign press;
- explain the function of a rubber stamp;
- identify the equipment and materials for manufacturing a rubber stamp;
- set the type for the matrix mold;
- produce and secure a rubber stamp to a wood mount;
- describe the function of a platen press;
- identify type styles and sizes and spacing materials;
- prepare a layout for a platen press;
- set type for a platen press;
- produce an acceptable print using a platen press.

X. Black and White Photography (C)

The student should be able to:

- explain the function of black and white photography;
- describe the process of making black and white photographs;
- identify the principles of photography;
- describe the principle of light reflection;
- explain the composition of light sensitive materials;
- produce a photogram;
- identify the basic types of cameras for graphic reproduction;
- describe the major parts of cameras;
- build and use a pinhole camera;
- use a light meter to determine the exposure setting for a film;
- operate a camera;
- describe the principle of film processing;
- develop a photographic film;
- use the contact printing method to process negatives into positive prints;
- use an enlarger for print production.

XI. Process Photography (C)

The student should be able to:

- describe the principle of process photography;
- identify the equipment and materials for process photography;
- recognize line reproduction and halftone images;
- identify the types of process cameras;
- explain the various methods of producing negatives, positives, and halftones;
- describe the materials requisite to process photography;
- identify the major parts of a process camera;
- compute proportional size reproduction by the percentage method;
- operate a process camera.

XII. Planographic Printing (C)

The student should be able to:

- define planographic printing;
- outline the history of planographic printing;
- collect information about the use of planographic printing in industry;
- explain the principle of planographic printing;
- describe the principles of offset printing;
- define platemaking;
- identify the various types of lithographic plates;
- prepare plates;
- describe the four basic systems of offset presses;
- identify the parts of each of the basic systems;
- operate the press.

XIII. Intaglio Printing (C)

The student should be able to:

- define intaglio printing;
- outline the history of intaglio printing;
- collect information about the use of intaglio printing in industry;
- explain the principle of intaglio printing;
- describe the operation of a basic rotogravure printing press;
- identify types of gravure plates;
- explain the procedures for preparing the various types of gravure plates;
- prepare a drypoint engraving;
- print from a drypoint engraving.

XIV. Packaging and Presentation (C)

The student should be able to:

- define finishing;
- identify the most common finishing operations;
- operate a paper cutter;
- identify the different types of paper folds;
- fold printed materials;
- punch, drill, gather, collate, and score printed materials;
- identify the various types of auxiliary finishing operations;
- explain the purpose of auxiliary finishing operations;
- define binding;
- identify common binding operations;
- bind printed materials;
- identify methods of packaging and distributing;
- assess the advantages of the methods of packaging and distributing.

XV. Color Photography (O)

The student should be able to:

- explain the importance of color photography;
- identify the formats of color still photography;
- explain the exposure and development processes for color slide films;
- process a color slide film;
- explain and use the exposure process for a color film;
- describe the chemical processes for developing a color film;
- process a color print.

XVI. Office Graphic Arts Equipment (O)

The student should be able to:

- recognize the need for office printing;
- outline the history of office printing equipment and processes;
- identify non-printing office graphic arts equipment;

- explain the influence of automation and technology;
- identify modern office printing equipment;
- describe the electrostatic printing process;
- operate an electrostatic copier;
- explain the use of electrostatic copying machines linked to computers.

XVII. Electronic Systems (O)

The student should be able to:

- demonstrate an awareness of the influence of computers on the graphic arts and communications processes;
- recognize the relationship of the computer to the graphic arts industry;
- identify new technological pre-printing processes;
- describe recent innovations related to printing processes;
- explain post-printing electronic applications.

OBJECTIVES: GRAPHIC COMMUNICATIONS MODULES

I. Student Orientation (C)

II. Safety (C)

III. Careers (C)

IV. Measurement (C)

The student should be able to:

- define measurement;
- explain the importance of and the need for measurement;
- recognize the need for standards;
- identify the measurement systems for graphic communications;
- explain the point system;
- use line gauges and drafting scales.

V. Planning and Design (C)

The student should be able to:

- define graphic communications;
- explain the purpose and the importance of graphic communications;
- define planning;
- develop an understanding of the importance of planning;
- identify the components of planning;
- recognize the fundamentals of design;
- explain the relationship of design to strength, function, appearance, materials, cost, and quality;
- identify the steps in the design process.

VI. Consumerism (C)

The student should be able to:

- define economic system;
- explain the basic parts of economic systems;
- identify the basic types of inputs;
- identify human needs;
- explain how graphic communications meet human needs;
- recognize the relationship between graphic communications and the economy;
- differentiate between needs and wants;
- recognize the concept of quality versus cost;
- explain the role of supply and demand;
- describe the effects of inflation;

- identify the positive and negative aspects of credit buying;
- recognize the importance of the services and products of graphic communications;
- collect information and examples of graphic communications;
- explain the relationship between graphic communications and advertising.

VII. Sketching (C)

The student should be able to:

- define sketching;
- describe the purposes of sketching;
- recognize the applications of sketching to industry and society;
- understand the need for using sequential steps in developing freehand sketching skills;
- recognize and use basic factors of freehand sketching;
- develop techniques for sketching lines and shapes;
- identify the reasons for lettering;
- develop techniques for lettering;
- identify the types of views;
- sketch one-view and two-view drawings;
- describe the procedure for enlarging and reducing sketches;
- use the graph method to enlarge and reduce sketches.

VIII. Mechanics of Drawing (C)

The student should be able to:

- recognize the importance of drafting tools;
- identify the various types of drafting tools;
- use drafting tools;
- identify drawing materials;
- select and use the proper paper and related materials for drafting projects;
- draw basic lines;
- explain line conventions;
- draw the various lines classified as the alphabet of lines;
- recognize the importance of and the need for dimensioning;
- read dimensions;
- dimension the overall measurements and features on the drawing of an object;
- recognize the importance of and the need for neat, legible, accurate, and standardized lettering;
- use lettering on drawings.

IX. Pictorial Drawing (C)

The student should be able to:

- recognize the purposes of pictorial drawings;
- identify the three most used types of pictorial drawings;
- describe isometric drawings;
- construct simple isometric drawings;
- define oblique drawing;
- identify the two forms of an oblique drawing;
- draw a simple oblique view of an object;
- explain the purpose of perspective drawing;
- identify the types of perspective drawings;
- construct simple perspective drawings.

X. Orthographic Drawing (C)

The student should be able to:

- recognize the purpose of orthographic drawings;
- draw top, front, and right-side views of an object;

- position the views according to the rules for orthographic projection;
- understand the need for sectional views;
- draw sectional views;
- describe the function of auxiliary views;
- draw auxiliary views;
- explain the purpose of patterns and pattern development;
- recognize the use of pattern development;
- prepare patterns for regular solids.

XI. Drawing Interpretation (C)

The student should be able to:

- recognize the necessity of reading and interpreting drawings;
- identify the various types of drawings used as inserts in graphic messages;
- recognize conventions related to manufacturing drawings;
- read and interpret drawing conventions in manufacturing drawings;
- recognize the conventions of simple construction drawings;
- read and interpret simple construction drawings;
- recognize conventions of simple assembly drawings;
- read and interpret simple assembly drawings;
- recognize the conventions of layouts for graphic messages;
- read and interpret layouts for graphic messages.

XII. Design Concepts (C)

The student should be able to:

- define design;
- describe the purposes of graphic design;
- identify design factors;
- identify the elements of design;
- explain the purpose of the elements of design;
- use the elements of design;
- identify the principles of design;
- describe the purposes of the principles of design;
- use the principles of design;
- describe the function of layout;
- identify types of layout;
- describe the characteristics of the types of layout;
- produce the various types of layouts;
- identify the various types of pre-printed aids;
- describe the use of photographs in layouts;
- prepare layouts using pre-printed and/or photo composition.

XIII. Screen-Process Printing (C)

The student should be able to:

- outline the historical development of screen-process printing;
- identify modern applications of screen-process printing;
- identify various types of stencils used in screen-process printing;
- list the basic steps involved in cutting paper stencils;
- cut paper stencils;
- print copies from a hand-cut paper stencil;
- identify the types of hand-cut film stencils;
- cut film stencils;
- print copies from a hand-cut film stencil;
- identify the types of photographic stencils;
- explain the indirect photographic stencil method;
- expose and develop an indirect photographic stencil;

- print copies of an indirect photographic stencil;
- explain the direct photographic stencil method;
- expose and develop a direct photographic stencil;
- print copies from a direct photographic stencil;
- describe the multicolored screen-printing process;
- prepare a design of two or more colors;
- prepare separate stencils for multicolor screen-printing of designs;
- print copies of stencils for multicolor designs;
- demonstrate the understanding of the concept of vacuum screen-printing;
- operate a vacuum screen-printer.

XIV. Relief Printing (C)

The student should be able to:

- define relief printing;
- outline the history of relief printing;
- explain the principle of relief printing;
- describe the function of a magnetic sign press;
- lay out type for a magnetic sign press;
- operate a magnetic sign press;
- explain the function of a rubber stamp;
- identify the equipment and materials for manufacturing a rubber stamp;
- set the type for the matrix mold;
- produce and secure a rubber stamp to a wood mount;
- describe the function of a platen press;
- identify type styles and sizes and spacing materials;
- prepare a layout for a platen press;
- set type for a platen press;
- produce an acceptable print using a platen press.

XV. Black and White Photography (C)

The student should be able to:

- explain the function of black and white photography;
- describe the process of making black and white photographs;
- identify the principles of photography;
- describe the principle of light reflection;
- explain the composition of light sensitive materials;
- produce a photogram;
- identify the basic types of cameras for graphic reproduction;
- describe the major parts of cameras;
- build and use a pinhole camera;
- use a light meter to determine the exposure setting for a film;
- operate a camera;
- describe the principle of film processing;
- develop a photographic film;
- use the contact printing method to process negatives into positive prints;
- use an enlarger for print production.

XVI. Process Photography (C)

The student should be able to:

- describe the principle of process photography;
- identify the equipment and materials for process photography;
- recognize line reproduction and halftone images;
- identify the types of process cameras;

- explain the various methods of producing negatives, positives, and halftones;
- describe the materials requisite to process photography;
- identify the major parts of a process camera;
- compute proportional size reproduction by the percentage method;
- operate a process camera.

XVII. *Planographic Printing* (C)

The student should be able to:

- define *planographic printing*;
- outline the history of planographic printing;
- collect information about the use of planographic printing in industry;
- explain the principles of planographic printing;
- describe the principles of offset printing;
- define *platemaking*;
- identify the various types of lithographic plates;
- prepare plates;
- describe the four basic systems of offset presses;
- identify the parts of each of the basic systems;
- operate the press.

XVIII. *Intaglio Printing* (C)

The student should be able to:

- define *intaglio printing*;
- outline the history of intaglio printing;
- collect information about the use of intaglio printing in industry;
- explain the principle of intaglio printing;
- describe the operation of a basic rotogravure printing press;
- identify types of gravure plates;
- explain the procedures for preparing the various types of gravure plates;
- prepare a drypoint engraving;
- print from a drypoint engraving.

XIX. *Packaging and Presentation* (C)

The student should be able to:

- define *finishing*;
- identify the most common finishing operations;
- operate a paper cutter;
- identify the different types of paper folds;
- fold printed materials;
- punch, drill, gather, collate, and score printed materials;
- identify the various types of auxiliary finishing operations;
- explain the purpose of auxiliary finishing operations;
- define *binding*;
- identify common binding operations;
- bind printed materials;
- identify methods of packaging and distributing;
- assess the advantages of the methods of packaging and distributing.

XX. *Color Photography* (O)

The student should be able to:

- explain the importance of color photography;
- identify the formats of color still photography;
- explain the exposure and development processes for color slide films;
- process a color slide film;
- explain and use the exposure process for a color

film;
- describe the chemical processes for developing a color film;
- process a color print.

XXI. Office Graphic Arts Equipment (O)

The student should be able to:

- recognize the need for office printing;
- outline the history of office printing equipment and processes;
- identify non-printing office graphic arts equipment;
- explain the influence of automation and technology;
- identify modern office printing equipment;
- describe the electrostatic printing process;
- operate an electrostatic copier;
- explain the use of electrostatic copying machines linked to computers.

XXII. Electronic Systems (O)

The student should be able to:

- demonstrate an awareness of the influence of computers on the graphic arts and communication processes;
- recognize the relationship of the computer to the graphic arts industry;
- identify new technological pre-printing processes;
- describe recent innovations related to printing processes;
- explain post-printing electronic applications.

implementation

IMPLEMENTATION

PROGRAM DESIGN

The curriculum guides have been designed to help teachers meet the needs of adolescents, with relevance to the rapid changes in society. These guides are flexible in order to encourage teachers to use personal knowledge and creativity in planning and implementing programs for each of grades seven, eight, and nine. The program contains the following features:

1. The format of the previous industrial arts curriculum has been changed and the subject content is more comprehensive. The format contains subject clusters, areas of study for each subject cluster, and core and optional modules for each area of study.

2. Practical and theoretical knowledge are interrelated. The content is practical in its purpose, organization and use, and theoretical in recognizing and understanding the concepts of self and interpersonal relationships, and the processes by which problems are solved and decisions are made.

3. Ideally, the curriculum is student-oriented in content and in approach to instruction. Emphasis is placed on creative exploration, self-direction, and independence. Because peer relationships are so important, some group work is emphasized. Instruction should be flexible to accommodate the wide variations in individual growth rates and stages of development.

4. The industrial arts curriculum has clearly defined objectives and program goals which become the criteria by which content is specified, procedures are developed, materials and resources are selected, and evaluative techniques are prepared.

5. Core modules with accompanying objectives have been identified for each area of study. For extended programs and maximum time allotment, teachers are expected to pursue topics beyond the core modules.

6. The sequential order within the subject clusters provides a systematic approach to the development of the program. The following are other approaches which will allow teachers flexibility in selecting learning content and processes to help students develop skills, attitudes, and understanding as bases for making and implementing reasonable, responsible decisions.

   The Process Approach involves the mastery of essential processes, such as searching, classifying, and categorizing information; hypothesizing, testing, valuing, criticizing, planning, problem-solving, and decision-making; and reporting.

   The Project Approach incorporates a number of different educational activities, such as investigating, analyzing, planning, constructing, synthesizing, evaluating, purposing, defining, and relating. The project should be a means to a goal and not the goal itself. The purposes of the project approach are to implement and develop the content and processes related to the area of study, as well as to contribute to the development of individuals.

The Decision-Making Approach is basic to all areas of the program and includes the processes of inquiry, valuing, decision-making, and action.

The Needs Approach assumes that individuals and groups of individuals have certain physical, aesthetic, social, and psychological needs, and is based on meeting those needs.

The Problem Approach, the case study, is based on the observation that individuals, groups, communities, and businesses encounter problems which relate to survival and living in society. The techniques used in the classroom should include a variety of problem situations related to everyday living.

7. Because learning is unique for each student, in every aspect of industrial arts, a rich environment for exploration must be provided. The environment for learning should include attractive, well organized and safe surroundings, suitable and sufficient materials, and good working equipment.

   Learning is facilitated if student purposes are achieved and if the student participates in the selection and planning of classroom projects. Classroom experiences should progress from one successful accomplishment to another.

8. The suggested activities are designed to help students achieve objectives. These experiences help students acquire knowledge, learn skills, evaluate attitudes and values, and develop understanding, appreciation, and perception. The most relevant activities provide the understanding necessary to lead to the achievement of the objective and greater support and credibility to the topic.

   The activities are suggestions only and are intended to provide initial assistance in developing a wide range of activities to meet the students' needs. Students should be involved in the selection of learning experiences. Teachers must consider the cultural background of students, previous experience, and students with special needs to provide maximum opportunities for learning.

   The structure of the content is the key to the encouragement of further learning.

SCOPE AND SEQUENCE

The subject clusters and areas of study taught will be dependent upon the type of laboratory and equipment. Some of the modules for the areas of study chosen may be taught separately as outlined, or combined. Industrial arts classes may be coeducational, all girls or all boys, or scheduled by class or areas of study selected.

Teachers should emphasize and integrate vocabulary study, safety, consumerism, career information, decision-making, interpersonal relationships, positive attitudes and work habits, communication skills, resource management, needs, values, goals, and laboratory organization throughout the program. To this end, these topics are woven into each area of study.

The scope and sequence should be a developmental progression of tasks and learning related to the areas of study and the modules chosen for each grade level. The following are criteria to consider when making choices:

1. the logical development of learning in each area;
2. the geographical and cultural background of the students;
3. students' maturation;
4. students' needs, including special needs, developmental tasks, experiences;
5. the amount of repetition that may be justified;
6. provision for new and exciting experiences;
7. the extent to which learning can be extended;
8. the resources available;
9. the most effective use of time, energy, and equipment.

TIME ALLOTMENT

Recommended time allotment for junior high industrial arts is 10% of the total program, 30 minutes daily/150 minutes weekly. One percent of time equals approximately 15 minutes of work per week. It is suggested that industrial arts be scheduled twice in the week or cycle. Different time blocks may have to be planned for students who have to travel to attend industrial arts classes. The time may also limit the number of objectives and/or projects which can be selected. It is recommended that the following flexible time allotments be used for the various grade levels:

- Grade 7 - 10-12%
- Grade 8 - 10-12%
- Grade 9 - 10-12%
- O.E.C. Grades 7, 8, 9 - 14-20%

There should be a balance of time alloted to the theoretic and practical aspects of the program. It is recommended that teaching theory comprise 30-40% of the time allotment and student practice comprise 60-70%. The estimated time listed for each module in the guide should be followed during instruction of theory and practice.

INTEGRATION

Within the industrial arts program, specific approaches and topics may be supportive of other programs in the school. Industrial arts students may share and integrate studies in such subjects as related mathematics, science, communication, and work adjustment (human relations) with mathematics, science, English, and guidance programs. In addition, units on energy and resource management, consumer education, career awareness, safety, and occupational aspects may be developed from topics included in the industrial arts curriculum.

Schools at the middle years level may develop a program for the pre-adolescent as an exploratory program prior to the implementation of industrial arts at the introductory level.

SELECTION OF MATERIALS

The suggested activities in the curriculum refer, in some instances, to approved textbooks and support materials which are basic to these activities. Classroom sets of selected, recommended materials would be desirable. There should be a balance of materials in and among all areas. Additional recommended references for each area of study are included in the bibliography.

The use of a variety of resource materials enriches the experiences of students in individual and group work. Because a wide variety of textbooks and publications are available in Manitoba schools, each teacher can support instruction with current information, suitable to student needs. Recently published textbooks and support materials are in metric. Industrial arts teachers have been introducing metric measurements and purchasing necessary equipment since Canada's conversion to the SI system.

EVALUATION

Evaluation is part of the education process and is necessary to determine whether the objectives have been met. It should assess various abilities, knowledge, and progress towards some objective(s). It should be considered as an ongoing, cooperative process of making judgements based on documented past and present experiences, with the aim of influencing the direction of future learning experiences.

The areas of study and modules emphasize both the practical aspects of skill mastery and the principles associated with the theories in industrial arts Students should be involved in evaluating their progress, in determining objectives for the areas of study and the modules, and in selecting methods of evaluation.

PROCESS OF EVALUATION

The purposes of evaluation in a given situation vary according to the needs at the time:

. assessing the attainment of an objective;
. measuring various aspects of learning, such as knowledge, values, and manual skills;
. discovering what students already know;
. motivating students to learn;
. providing information for guidance and counselling;
. providing a basis for curriculum change.

Stating objectives is the first and most important step in the evaluation process. They can be stated in a variety of ways and can provide for cognitive, affective, and psychomotor outcomes at all levels, from simple to complex. The interrelationships among these three domains are evident. Seldom does a learning situation involve only one, and often there are situations which involve all three.

Cognitive objectives should include all six cognitive levels. Affective objectives should help students become aware of their own values and appreciate the need for tolerance of the values of others. Psychomotor objectives should stress the process of learning rather than the product.

Objectives are most effective in evaluation when they are:

. stated in terms of desired student learning outcomes;
. consistent with the structure of the subject matter;
. realistic in terms of students' abilities;
. related to learning principles;
. respective of the needs of the learners.

EVALUATION TECHNIQUES AND METHODS

The following points apply to all evaluation techniques and methods:

. The choice of evaluation procedure will reflect the purposes for which results will be used.
. The greater the variety of evaluation techniques used, the more probable is a fair judgement.
. Motivation and achievement are affected by the type of evaluation method chosen.
. The intent of an objective and the method used to evaluate should be related.
. To be sound, the procedure selected must measure the content it is chosen to measure.

- The type of subject matter taught affects the choice of evaluation techniques.
- Attitudes are more likely to be positive if students participate in determining objectives, selecting means of evaluation, and evaluating their own progress.
- When learners can use self-evaluation techniques, they are better able to identify their own needs and to take initiative in learning.
- The effectiveness of evaluation techniques is affected by the balance among validity, reliability, usability, and the evaluation techniques selected.

Evaluation techniques may be classified as:

1. Real life situations:
    - observational techniques;
    - peer appraisal and self-report techniques.
2. Simulation techniques.
3. Laboratory management and techniques.
4. Projects. When ranking, quality is important but the time taken to complete the project must also be considered. The project should show evidence of an appreciation of the dignity of craftsmanship and a pride in the high level of achievement.
5. Tests. Tests provide some type of educational feedback that other techniques cannot provide. They include written tests, oral tests, performance tests, and written exercises.

STUDENTS WITH SPECIAL NEEDS

Both gifted students and those with special handicaps may benefit from study in the industrial arts program. Teaching these students successfully requires a sound knowledge of their characteristics and of effective ways of teaching them, and a desire to release the potential of these students for satisfying living.

Special needs may be categorized as:

- Physical - deafness/hearing impairment, blindness/visual impairment, orthopedic handicap, general health impairment.
- Cultural - language and experiential background effects.
- Emotional - ranging from mental illness (severe) to interpersonal relationship problems (less severe).
- Intellectual - general cognitive ability, with particular reference to conceptualization and abstraction.

Administrators and teachers have identified the following five areas of educational needs for special students (the degree of need varies according to the individual):

1. socialization skills;
2. positive self-concept development;
3. daily living activities experiences;
4. independence;
5. employability and occupational skill development.

STRATEGIES TO DEVELOP AN APPROPRIATE PROGRAM

- Be as well informed about students as possible.

- Be aware of impact of various family lifestyles.

- Apply teaching strategies and materials consonant with the students' learning strengths and weaknesses, and cognitive functioning abilities.

- Some teaching strategies are applicable for all learners, regardless of ability; e.g., reinforcement and encouragement, simple clear directions, use of examples, and fostering a caring relationship.

- All students, regardless of handicap, need to learn to read, write, compute, make decisions and solve problems.

. Each student with a special need presents a unique challenge to the teacher to develop basic concepts and skills for that individual to proceed independently to the level of his/her ability.

. Some adaptation of the industrial arts facility and special equipment may be necessary for convenient and safe use of equipment and space. An enriched program may require additional materials and laboratory equipment.

. Essential content and skills are necessary for the handicapped student to master, as well as for everyone else.

. Instruction for the handicapped should be as systematic as possible.

. Content and/or skills should be broken down into small, discrete segments, then linked together in a logical, organized sequence. Sometimes, the teacher needs to decrease the degree of content and/or increase the number of examples to aid the low-ability learner.

. Constant reinforcement is important. Retention problems are reduced if strategies include careful task analysis, hands-on experiences, tactile demonstrations, and recognition of individual differences and needs.

. Encourage the optimal development of the gifted students by enriching the program, employing unusual and challenging teaching and motivational devices, and encouraging students to maintain established high levels of achievement.

. All students should be encouraged to experiment, innovate, search, test, and observe.

. The instructional approach should stimulate students' range of knowledge, skills, and their desire for expanding creative abilities, and provide opportunities to work independently, assume responsibility, and develop leadership abilities.

common modules

COMMON MODULES: Student Orientation,
Safety, Careers

COMMON MODULES

1. STUDENT ORIENTATION (C.) Estimated Time: 3 hours

MAJOR OBJECTIVE: To explore and relate the significance of industrial arts to the needs of individuals, industry, and society.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Integrate and emphasize this topic throughout all areas of study.	
A. PROGRAM OVERVIEW		
	Have the students prepare and maintain an indexed, three-ring notebook as an ongoing project. Discuss the purposes of maintaining a well-organized notebook. Point out that the notebook will help the students build upon the ideas and information gained in class. Encourage the students to include the following in their notebooks: notes, sketches, vocabulary, illustrations, diagrams, articles from newspapers and technical periodicals, handouts, and instruction sheets. Have the students use drafting skills to label each of the inserts and to copy illustrations.	Notebook PURPOSES OF NOTEBOOK PROJECT 1. To provide a record of learning and progress 2. To develop a source of reference information
The student should be able to:		
1. define Industrial Arts;	Have the students locate, discuss, and compare definitions for industrial arts. Ask them to formulate their own definition.	INDUSTRIAL ARTS: A phase of general education which familiarizes students with the tools, products, processes, and occupations of industry as well as the social

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Emphasize the following points during the discussion of definitions. Industrial arts are educational programs which are pertinent to the body of related subject matter or courses organized for the development of understanding about technical, consumer, occupational, recreational, organizational, managerial, social, historical, cultural, and technological aspects of industry. The programs include experiences involving such activities as experimenting, designing, constructing, and evaluating, and processes providing opportunities for creativity, problem solving, and aiding individuals in making informed and meaningful occupational choices.	and economic phenomena of their technological world OR A curriculum area which includes the following phases of general education which deal with technology: its evolution, utilization, and significance; with industry: its organization, materials, occupations, processes, and products; and with the problems and benefits resulting from the technological and industrial nature of society
2. develop an understanding of the role of industrial arts;	Discuss the role of industrial arts in the general education of students. Relate the discussion to the definition and program goals of industrial arts. Throughout the discussion, make the students aware of goals which are common to all levels of industrial arts.	Industrial Arts 7-9: Construction, Graphic Communications, Power/Energy, and Manufacturing, Manitoba Department of Education GOALS COMMON TO ALL LEVELS OF INDUSTRIAL ARTS 1. Development of an insight and understanding of industry and its place in our culture 2. Discovery and development of talents, aptitudes, interests, and potentials of individuals for the technical pursuits and applied sciences

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
		3. Development of an understanding of industrial processes and the practical application of scientific principles 4. Development of basic skills in the proper use of common industrial tools, machines, and processes 5. Development of problem-solving and creative abilities involving materials, processes, and products of industry
3. recognize the relationship between junior high school and senior high school industrial arts;	Describe the relationship between the junior high school and the secondary school programs for industrial arts. Have the students refer to the goals common to all levels of industrial arts and prepare bulletin board displays, charts, or reports about both levels of programs.	Curriculum guides for senior high school programs in industrial arts
4. develop an understanding about the avocational and vocational activities and interests in industrial arts.	Explain the terms avocation and vocation. Discuss the relationship and the difference between avocational and vocational activities of industrial arts. Emphasize how laboratory activities and projects develop knowledge and skills to attain both avocational and vocational goals of industrial arts. Make the students aware of the recreational aspects of industrial arts. Provide information about and experience in the basic processes of various types of industries so that the students may be more competent to choose vocations.	AVOCATION: An activity usually engaged in for enjoyment, in addition to one's regular work or profession VOCATION: A regular occupation or profession; especially, for which one is particularly suited or qualified

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Have the students prepare collages, bulletin board displays, charts, posters, brochures, or reports about the avocational and vocational aspects of industrial arts.	
B. JUNIOR HIGH SCHOOL INDUSTRIAL ARTS The student should be able to:		
1. list the subject clusters for junior high school industrial arts;	Make the students aware of the subject clusters in the industrial arts program for junior high schools in Manitoba. Provide information about each of the subject clusters.	SUBJECT CLUSTERS FOR INDUSTRIAL ARTS IN THE JUNIOR HIGH SCHOOL 1. Construction 2. Graphic Communications 3. Power/Energy 4. Manufacturing
2. identify the areas of study for each of the subject clusters;	Point out the areas of study pertinent to each of the subject clusters. Have students collect information about and prepare diagrams, charts, and posters to illustrate the relationship between the areas of study and the subject clusters. Discuss purposes of studying the subject clusters and have the students prepare illustrated reports/brochures. Have the students identify and discuss some of the industrial processes and technological developments for each of the areas of study.	SUBJECT CLUSTERS — AREAS OF STUDY 1. Construction — Construction 2. Graphic Communications — Drafting, Graphic Arts, Graphic Communications 3. Power/Energy — Electricity/Electronics, Power Mechanics, Power/Energy 4. Manufacturing — Metalwork, Plastics, Woodwork, Manufacturing

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
3. develop an awareness of the modules for each of the areas of study;	Prepare transparencies, charts, posters, brochures, or handouts to provide the students with information about the various modules in each of the areas of study. Have the students discuss the correlation of the modules to the areas of study and the subject clusters.	Industrial Arts 7-9, Manitoba Department of Education
4. develop an awareness of the industrial arts program in the local school division/school.	Discuss with the students the industrial arts subject clusters and areas of study available in the school division and school. Take the students on a tour of the laboratory and provide the students with handouts describing the program.	Industrial arts laboratory
C. RESOURCE MATERIALS The student should be able to:		
1. identify reference materials;	Prepare a display or have the librarian prepare a display of reference materials related to industrial arts. Explain the materials.	REFERENCE MATERIALS 1. Catalogues 2. Service manuals 3. Directories (city, telephone, trade) 4. Machine equipment and tool manuals 5. Textbooks 6. Periodicals 7. Audio-visual materials
2. develop the ability to use reference materials;	Provide the students with opportunities to use reference materials for technical research, report writing, problem solving, and projects.	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
3. identify community resources.	Discuss and have the students assist with a compilation of lists of industries, speakers, and other community resources to enhance the teaching/learning strategies for industrial arts.	Lists of industries, speakers, and other community resources

II. SAFETY (C.)

Estimated Time: 4 hours

MAJOR OBJECTIVE: To develop a high degree of safety consciousness, practice, and application in the use of tools, equipment, and processes through a wide range of exploratory experiences as they relate to individuals and to the production and services aspects of hobbies and industries.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Integrate and emphasize safety instruction and practice throughout all areas of study in the industrial arts program. Provide a continuous safety program related to each area of study.	
A. SAFETY AWARENESS The student should be able to:		
1. understand the need for and the importance of safety;	Discuss the contribution of knowledge, skills, and positive attitudes to safe living and working conditions in homes, schools, and communities.	On Guard (color filmstrip, cassette, program guide), Prentice-Hall, Inc. "If I Had a Hammer" (16 mm color film), Manitoba Department of Education
2. identify and follow safe behavior;	Discuss the importance of safe behavior and practices. With the class, develop a set of rules for behavior. Make the students aware of the reasons for and the advantages of each rule. Have the students prepare posters, charts, or transparencies of the rules. Emphasize that each student has a responsibility not only to self but to the class for safe behavior at all times.	Tips For New Employees (slides), available from Workplace Safety and Health Division, Department of Labour and Manpower, Norquay Building, Winnipeg, Manitoba R3C 0P8

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
3. identify and explain the symbols denoting hazards;	Show the students the various symbols denoting hazards; e.g., fire, explosion, poison. Encourage the students to study charts and posters to learn symbols for safety hazards.	The Safety Program (color filmstrip, cassette, program guide), Prentice-Hall, Inc. General Shop Safety (color, sound filmstrip), Vocational Filmstrip Company
4. accept responsibility for developing safety habits;	Make the students aware that they are responsible for safety. Emphasize that safety in home, classroom, industrial arts laboratory, school, and community means protecting oneself and others from possible injury and danger. Explain and demonstrate the ABC of safety: Always Be Careful! Remind the students frequently about the need to be safety conscious by integrating safety instruction throughout the areas of study in the program.	Safety/Health Guide for Industrial Arts, Vocational Industrial, Home Economics, and Business Education, Manitoba Department of Education The Workplace Safety and Health Act, Manitoba Statutes, Queen's Printer Safety Attitudes (slides), Workplace Safety and Health Division, Department of Labour and Manpower, Norquay Building, Winnipeg, Manitoba R3C 0P8
5. explain the causes and effects of common industrial accidents.	Discuss the relationship between causes and effects of accidents. Assign readings from reference materials, periodicals, and daily newspapers for class discussion on industrial accidents. Invite guest speakers to speak on accidents and their prevention. Explain the relationship between the safety requirements used in the industrial arts laboratory and those used in industry.	"Everything to Lose," "The Split Second" (16 mm color films), Workplace Safety and Health Division, Department of Labour and Manpower, Norquay Building, Winnipeg, Manitoba R3C 0P8 Occupational Health and Safety: A Training Manual, Copp Clark Pitman "It's Happened Before" (16 mm color film), Film Library, Manitoba Hydro

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
B. ORGANIZATION OF LABORATORY The student should be able to:		
1. demonstrate a knowledge of the organization of the industrial arts laboratory;	Take the students on a tour of the industrial arts laboratory and emphasize the importance of and the relationship among safety, cleanliness, and organization. Encourage the students to study safety charts, posters, and signs placed around the laboratory. Have the students locate fire extinguishers, first-aid kits, telephones, and fire exits.	Industrial arts laboratory Student work stations Safety charts, posters, signs Setting up Shop Safety Lectures (program), Workplace Safety and Health Division, Department of Labour and Manpower, Norquay Building, Winnipeg, Manitoba R3C 0P8
2. recognize the relationship of laboratory layout to safety;	Make the students aware that the laboratories provide an environment for the development of safety concepts and habits that will help guide the actions of the individual in all life situations. Assess and discuss the layout of each laboratory with the students. Have the students prepare a list of limitations and unsafe conditions in the layout of the laboratory and suggest methods and procedures to follow in overcoming or coping with these limitations and conditions. Emphasize the importance of orderliness and safety in the laboratory. Point out areas where accidents may happen.	"Confined Space Hazards" (16 mm color film), Workplace Safety and Health Division, Department of Labour and Manpower, Norquay Building, Winnipeg, Manitoba R3C 0P8

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
3. recognize the potential hazards of tools, equipment, machines, and materials;	Show the students the difference between the incorrect and correct way to use and handle tools, equipment, machines, and materials. Emphasize and have the students practice correct usage and handling techniques. Make the students aware of how accidents may occur and how to avoid them.	
4. explain the purpose of proper storage of tools, equipment, and materials.	Identify and discuss the storage areas requisite for various types of tools, equipment, and materials. Point out why proper storage areas are essential for safety in the laboratory.	
C. CLOTHING AND PROTECTIVE DEVICES		
The student should be able to:		
1. explain the need for and the importance of safe clothing;	Discuss and make the students aware of the relationship of clothing to the work being done and to safety in the laboratory. Have individual or groups of students prepare bulletin board displays, charts, and posters about safe clothing requisite for each area of study.	Bulletin board displays, charts, posters
2. wear clothing appropriate for industrial arts laboratories;	Have students examine and demonstrate the use of appropriate clothing for each industrial arts laboratory. Point out	Your Feet Are Your Fortune (slides), Workplace Safety and Health Division, Department of Labour and Manpower,

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	the hazards associated with loose clothing, neckties, jewellery, long hair, and long sleeves. Demonstrate and/or have the students demonstrate methods of overcoming these hazards.	Norquay Building, Winnipeg, Manitoba R3C 0P8
3. understand the need for and the importance of protective devices;	Identify and explain the purpose of various types of protective devices. Discuss and demonstrate the importance and methods of sanitizing protective devices such as safety glasses, protective hearing devices, and respirators.	PROTECTIVE DEVICES 1. Gloves 2. Safety glasses 3. Respirators 4. Hard hats 5. Hearing devices (ear plug, ear muff) 6. Footwear 7. Safety straps 8. Hair bands/nets 9. Machine guards 10. Aprons
4. use protective devices when required.	Demonstrate the proper use of protective devices. Insist that students use protective devices when needed. Use posters, charts, transparencies, slides, photographs, and films to show the correct use of protective devices. Display safety posters near machines and equipment.	Protecting Your Eyes (color filmstrip, cassette, program guide), Prentice-Hall, Inc. "The Sound of Sounds," "We'll See Tomorrow" (16 mm color films) and Guard Your Sight (slides), Workplace Safety and Health Division, Department of Labour and Manpower, Norquay Building, Winnipeg, Manitoba R3C 0P8

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
D. PROCEDURES The student should be able to:		
1. describe daily procedures to be followed in industrial arts laboratories;	Identify and discuss the daily procedures for industrial arts laboratories. Have the students list, prepare charts, and follow daily procedures. Make the students aware of the reasons, the advantages, and the relationship of well-organized daily procedures to safety.	
2. identify and accept responsibility for housekeeping practices;	Point out that good housekeeping practices will aid in the prevention of accidents as well as provide a pleasant, well-organized environment for work and learning. If feasible, have the students accept responsibility for the following routine, daily, housekeeping activities: - daily removal of all waste materials; - establishment of safety zones in order to maintain required aisle space and working space around machines; - clean-up of shop equipment and floors at the end of each period; - reporting of unsafe tools, equipment, and machines.	"Housekeeping Means Safekeeping" (16 mm color film) and Keep It Clean for Safety's Sake (slides), Workplace Safety and Health Division, Department of Labour and Manpower, Winnipeg, Manitoba R3C 0P8

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
3. identify emergency procedures;	Make the students aware of emergency procedures related to fire, first-aid, and accidents.	"The A, B, C's and D's of Portable Fire Extinguishers" (16 mm color film), Film Library, Manitoba Hydro
4. practice and use emergency procedures.	Review and practice emergency procedures for leaving the laboratory.	
	Discuss location and use of emergency equipment such as fire extinguishers and panic buttons.	Preparing for Emergencies; Wounds, Sprains, Fractures; Shock, Fainting, Burns; Artificial Respiration (color filmstrips, cassettes, program guide), Prentice-Hall, Inc.
	Explain the importance of an easily accessible, properly maintained, and marked first-aid kit. Emphasize the need to provide only emergency first-aid for serious injuries and then refer to qualified medical personnel for treatment.	
	Establish a procedure for reporting all accidents, no matter how trivial. Explain the purpose and the use of accident report forms. Have the students complete accident report forms. Make the students aware of the function of and the benefits available under the Workers' Compensation Act.	Examples of accident report forms The Workers' Compensation Act, Manitoba Statutes, Queen's Printer

III. CAREERS (C.)

Estimated Time: 3 hours

MAJOR OBJECTIVE: To gain information about the general occupational characteristics of a variety of career fields and to match interests, abilities, preferences, and values to characteristics of various careers.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Integrate and emphasize career instruction throughout all areas of study in the industrial arts program. Provide specific career information for each area of study.	
A. CAREER CLASSIFICATIONS The student should be able to:		
1. develop an awareness of the major groups of occupations;	List and outline the major occupational groups. Discuss important points to consider in studying occupations. Use assignment sheets based on The Canadian Classification and Dictionary of Occupations.	The Canadian Classification and Dictionary of Occupations, Department of Manpower and Immigration, Canada
2. collect information about careers related to the major groups of occupations;	Encourage students to begin the preparation of well-organized, indexed career folders for intensive studies of various careers. Point out the relationship between careers in major groups of occupations and the eleven areas of study in the industrial arts program.	Training Manual for Canadian Classification and Dictionary of Occupations, Volume I, Department of Manpower and Immigration, Canada Industrial Arts 7-9, Manitoba Department of Education

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
3. identify careers related to the areas of study in the industrial arts program.	Discuss and have the students prepare charts, posters for the classroom or reports for career folders, showing the relationship between possible career choices and the areas of study. Organize the instructional program so that the concepts studied clearly identify the kinds of jobs involved in specific areas of the industrial arts program. Develop and implement a career information center/corner/shelf in the laboratory or classroom. Have the students assist with the organization and sponsorship of a career fair in the laboratory, school, and/or community shopping center. Require the students to show the training requirements for each of three possible occupations.	Aircraft Mechanic, Architectural Drafting, Career of an Auto Mechanic, A Career in Cabinet Making, Careers in Graphic Arts; Silkscreening, The Electrician Kit, The Machinist in the Plastic Moulding Industry, Sheet Metal Working Is . . . (color slides, audio cassettes, carousel slide trays), Department of Education Library, 1181 Portage Avenue, Winnipeg, Manitoba R3G 0T3 Basic Drafting, Chas. A. Bennett, Co., Inc., pp. 12-17 Drawing and Planning for Industrial Arts, Chas. A. Bennett, Co., Inc., Section 6. The Basic Book of Drafting, American Technical Society, Unit 2 The Basic Book of Graphic Arts, American Technical Society, Unit 2 Basic Graphic Arts Procedures, 4th ed., American Technical Society, Chapter 14 Graphic Arts Fundamentals, The Goodheart-Willcox Company, Inc., Unit 2 Introduction to Graphic Arts, American Technical Society, Section 12 Graphic Arts, McKnight Publishing Company, Chapter 1

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
B. SKILLS AND APTITUDES The student should be able to:		
1. develop an awareness of the major groups of occupations;	Review the many types of occupations and careers pertinent to the major groups of occupations in Canada. Discuss and have the students locate similar information for the major groups of occupations in Manitoba. Ask the students to prepare lists or maps of locations of local industries/business and identify their related major occupations. Have the students develop a classroom file of occupations in the local business community. Discuss the relationship of industrial arts to the various types of occupations.	The Canadian Classification and Dictionary of Occupations, Department of Manpower and Immigration, Canada Canada Year Book and Canada Handbook, Statistics Canada Careers Manitoba, Volumes 1, 2, 3, 4, Employment and Immigration, Canada The Manitoba Career Guide, Manitoba Department of Education Manitoba Trade Directory, Sanford Evans Publishing, Limited Telephone and city directories Newspapers
2. identify skills required for specific jobs;	Provide students with information about job titles and descriptions that illustrate the variety of jobs in different types of industries. Have the students research job descriptions for specific jobs of their choice. Identify or have the students identify the skills requisite for their chosen specific jobs.	The Canadian Classification and Dictionary of Occupations, Department of Manpower and Immigration, Canada

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Provide the students with a list of educational and training programs related to major occupational areas and specific jobs. Have the students prepare charts, posters, or reports on the educational requirements for the jobs being investigated.	Textbooks for each of the areas of study in industrial arts
3. identify personal interests, abilities, and needs;	Discuss and have the students analyze personal interests and abilities by completing a self-assessment inventory at the beginning of the first year and at the end of the final year in the industrial arts program. Have the students discuss and include the following in the self-assessment inventory: interests, skills, preferences, goals, etc. Point out that each individual wishes to fulfill certain needs and hopes and achieve certain goals from a job. Have the students identify and rank the ten most wanted needs and hopes related to a job. Encourage the students to discuss the merits of the choices and the ranking of the needs and hopes.	Self-assessment inventory forms
	Emphasize that in order to make decisions about future careers, it is important to keep up-to-date, complete information about personal abilities, interests, hopes, and achievements as well as current information about many jobs.	*Careers*, Reed Career Service (bi-monthly) Current job information *The Index to Canadian Occupations* (kit), Canadian Government Publishing Centre
	Have the students compare personal information with the information discovered	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	about jobs. Indicate that this process will assist students with making appropriate career decisions. Point out that self-evaluation of interests and abilities provides the foundation for personal career planning.	
4. recognize the relationship of attitudes to working conditions;	Discuss and have the students identify the attitudes that foster achievement on the job. Point out that regardless of future employment, students will be expected to work with others in a variety of situations. Indicate that in order to carry out various industrial activities, groups of individuals must work together. Explain the importance of good manners, cheerfulness, and punctuality. Emphasize pride in work, self-worth, safety consciousness, regular attendance, cooperation, industriousness, and friendliness. Have the students prepare charts, posters, or reports on indicators of good attitudes. Use case problems, in-class decision-making exercises, and out-of-class group projects in the development of human relation skills.	INDICATORS OF A GOOD ATTITUDE 1. Punctuality 2. Attendance 3. Neatness 4. Honesty 5. Cooperation 6. Friendliness 7. Industriousness 8. Self-confidence
5. identify realistic educational and training plans for specific occupational areas;	Review skills required for specific jobs; personal interests, abilities, and needs; and the comparison of personal information with information discovered about jobs. Have the students match personal credentials with educational and vocational opportunities and requirements by	Creating a Career Program, Canadian Government Publishing Centre Occupational analysis forms

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	completing an occupational analysis form. Relate the occupational analysis to the areas of study in the industrial arts program. Point out that the completion of an occupational analysis form for each job studied will provide important clues about future vocational goals and assist with the selection of a high school program of studies.	REED CAREER SERVICE VIDEOTAPE CAREER AWARENESS RESOURCE LIBRARY Carpentry B-2 Chemical and Plastics Processing F-1 Concrete Finishing B-3 Drafting O-4 Electrical and Electronic Engineering A-8 Electrical Power, Lighting and Wire Communications B-4 Electronic Products Manufacturing G-6 General Manufacturing G-8 Graphic Arts O-6 Insulating and Roofing Occupations B-6 Mechanics O-9 Metal Machining G-11 Metal Products F-4 Metal Shaping and Forming G-12 Photography D-5 Photographic Processing O-13 Plastering, Painting and Paper Hanging B-8 Printing O-14 Rubber and Plastic Products Manufacturing G-14 Sheet Metalwork G-15 Wood Processing F-9 Wood Products Manufacturing G-19
6. recognize the impact of technology on careers;	Discuss the influence of technology on employment trends, life styles, and speed of career change. Point out the changes in jobs and roles of employees. Make the students aware of the relationship between technological developments and career preparation and the impor-	"The Thinking ?? Machine," "Incredible Machine" (films), Manitoba Telephone System, Public Relations Department

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	tance of planning for contingencies. Have the students assess the extent to which technological change may affect the employment opportunities and occupational requirements of a given occupation.	Humanized Technology (video recording and viewer's guide), Fast Forward Series 1 Implications (video recording and viewer's guide), Fast Forward Series 2
7. explain the influence of social and economic trends on careers.	Identify and discuss social and economic trends and their effects on social and economic aspects of various occupations. Ask the students to assess the future social and economic status of a given occupation. Have the students identify those occupations for which training and experience are sufficiently similar to a given occupation, that they may choose as alternate employment possibilities in the event that technological change eliminates a given occupation.	Newspapers Radio and television news
C. JOB-SEARCH TECHNIQUES The student should be able to:		
1. identify the ways in which jobs are advertised;	Discuss methods used to advertise jobs. Have the students collect and discuss examples of job advertisements and prepare charts, posters, or bulletin board displays.	JOB ADVERTISEMENT SOURCES 1. School guidance counsellors 2. Canada Manpower 3. Employment agencies 4. Newspapers, periodicals

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
2. understand the purposes of a job description;	Obtain or write job descriptions. Have the students examine and assess the advantages and disadvantages of job descriptions. Ask the students to discuss and prepare a list of the purposes of job descriptions.	PURPOSES OF JOB DESCRIPTIONS 1. Outline duties 2. Describe routines 3. Assign responsibility 4. Delegate authority 5. Designate accountability 6. Prevent conflicts 7. Describe general ability requirements 8. Categorize personnel 9. List expected skills and attitudes 10. State desired education
3. explain the need for a resumé, an application, and an interview.	Show or have the students collect examples of resumés, letters of application, and application forms. Have the students explain the purposes and compare the format and content of resumés, letters of application, and application forms. Point out that application forms and resumés often contain similar information. Ask the students to write a resumé and a letter of application and complete an application form for a specific job description or advertisement.	Resumés Letters of application Application forms
	Discuss the interview processes and techniques.	The World of Business: A Canadian Profile, Wiley Publishers of Canada, Ltd., Chapter 13, Unit B
	Emphasize that students will be expected to communicate in all career situations. Make the students aware that good communication starts with an application form and the interview and continues with company/business reports	

115

116

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	and interaction with customers and co-workers. Point out the importance of basic reading, writing, speaking, and computing skills, and assist the students to develop them in all class activities.	

drafting

CORE MODULES: Student Orientation, Safety, Careers, Measurement, Planning and Design, Consumerism, Sketching, Mechanics of Drawing, Pictorial Drawing, Orthographic Drawing, Drawing Interpretation, Drawing Reproduction, Electronic Systems

DRAFTING

I. STUDENT ORIENTATION (C.)

Estimated Time: 3 hours

MAJOR OBJECTIVE: To explore and to relate the significance of industrial arts to the needs of individuals, industry, and society.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	NOTE: Refer to Common Modules for Module I, Student Orientation.	Industrial Arts 7-9: Graphic Communications (Drafting, Graphic Arts, Graphic Communications); Module I, Student Orientation Joint Explorations Program for Home Economics/Industrial Arts 7, Interim Guide, Manitoba Department of Education

II. SAFETY (C.)

Estimated Time: 4 hours

MAJOR OBJECTIVE: To develop a high degree of safety consciousness, practice, and application in the use of tools, equipment, and processes through a wide range of exploratory experiences as they relate to individuals and to the production and services aspects of hobbies and industries.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	NOTE: Refer to Common Modules, Module II, Safety. Emphasize the following: a) Students learning the basics of drafting must learn safety precautions. b) The right way of doing a job is the safe way. c) The use of safety precautions is protection against injury. d) Safety is a matter of good common sense and good judgment. e) The importance of applying safety precautions in all shop activities is essential to making them a part of regular work habits.	Industrial Arts 7-9: Graphic Communications (Drafting, Graphic Arts, Graphic Communications), Module II, Safety

III. CAREERS (C.) Estimated Time: 3 hours

MAJOR OBJECTIVE: To gain information about the general occupational characteristics of a variety of career fields and to match interests, abilities, preferences, and values to characteristics of various careers.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	NOTE: Refer to Common Modules, Module III, Careers. Integrate and emphasize career instruction throughout the drafting area of study by familiarizing the students with many careers, by providing a foundation on which to make career choices, and by encouraging self-evaluation in relation to various career opportunities and future goals.	Industrial Arts 7-9: Graphic Communications (Drafting, Graphic Arts, Graphic Communications), Module III, Careers

IV. MEASUREMENT (C.)

Estimated Time: 4 hours

MAJOR OBJECTIVE: To gain knowledge and skills related to imperial and SI metric systems of measurement and drafting scales.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Integrate and emphasize instruction, practice, critical thinking, and applications of measurement throughout drafting modules.	
A. INTRODUCTION TO MEASUREMENT The student should be able to:		
1. define measurement;	Discuss and have the students prepare a definition of measurement. Emphasize that measurement is a method used to communicate information about size, shape, distance, and weight. Have the students give examples of drafting measurements related to these dimensions. Make the students aware that measurement is made by comparing an unknown quantity with a standard or known quantity.	MEASUREMENT: A method of communicating size, shape, distance, and weight
2. explain the importance of and the need for measurement;	Discuss and make the students aware of the relationship between good workmanship and accurate measurements. Ask the students to identify ways in which measurement applies to various aspects of drafting. Have the students prepare	The Basic Book of Drafting, American Technical Society, Unit 7 Drawing and Planning for Industrial Arts, Chas. A. Bennett Co., Inc., Section 1, Unit 2

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	charts, bulletin board displays, or illustrated reports on the development of the measuring system from ancient times to the present.	Drafting: Metric, American Technical Society, Unit 2
3. recognize the need for standards.	Explain that standards for drafting have developed over the years and have been agreed upon by people/organizations such as ISO, ANSI, and CSA, with representation from many industries.	ISO: International Organization for Standardization ASNI: American National Standards Institute
	Inform the students that the published standards define measurement of length, volume, weight, time, and other values. Point out that measurements in drafting must be related to standardized materials used to make products and structures.	CSA: Canadian Standards Association
B. DRAFTING SCALES The student should be able to:		
1. define scale;	Discuss the definitions for the term scale as it applies to drafting. Point out that there are two definitions: one relating to the size of the drawing and one relating to a tool used in drafting. Show the students examples of each.	SCALE: The relationship between the size of the drawing and the size of the object it represents OR A tool used for measuring in various types of drafting plans

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
2. recognize the need for scales in technical drawing;	Show the students examples of various types of technical drawings for highways, bridges, buildings, cars, farm implements, parts of cars and implements, and maps. Have the students locate, read, and explain the scale information on the technical drawings.	Examples of technical drawings
3. identify the scales used in technical drawing;	Make the students aware that scales are simple means of making a drawing the same size as, larger, or smaller than an object. Show the students examples and explain the application of the different types of drafting scales. Make the students aware of the similarities, differences, shapes and sizes, and units used on each of the scales.	TYPES OF DRAFTING SCALES 1. Architects' scale 2. Engineers' scale 3. Mechanical drafting scale Basic Drafting, Chas. A. Bennett Co., Inc., Unit 8
4. use drafting scales.	Explain and demonstrate the correct use of each of the drafting scales. Give the students opportunities to use the scales to develop the skill of measuring accurately. Emphasize that accurate drawings require accurate measurements and that regardless of the scale used, the actual size dimensions are always placed on the drawing. Point out that the people who use the drawing to make something never measure the drawing itself, but rather, they follow the dimensions on the drawing.	The Basic Book of Drafting, American Technical Society, Units 7, 8 Exploring Metric Drafting Basic Fundamentals, The Goodheart-Willcox Company, Inc., pp. 41-42 Drafting: Metric, American Technical Society, Unit 11

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
C. METRIC MEASUREMENTS AND SCALE The student should be able to:		
1. explain the term SI;	Discuss and point out that SI is an abbreviation which identifies the International System of Units, established by agreement among many nations to provide a logical, interconnected framework for all measurements used in industry, science, and commerce.	Metric Units (transparencies), Administration Information Media Educational Aids
2. identify the basic units of measurement;	Explain that SI is a modernized version of the metric system and relates to the basic units of measurement.	BASIC UNITS OF MEASUREMENT 1. Length 2. Time 3. Mass 4. Temperature 5. Electric current 6. Luminous intensity
3. understand the applications of SI metric and imperial units of measurement used in drafting;	Explain and have the students identify SI metric units and imperial units of measurement used in various types of drafting and drafting activities. Have the students prepare charts in notebooks and display charts for the classroom to identify SI metric and imperial units of measurement and their applications to drafting. Show the students examples of conversion charts which indicate in one system the equivalent value of a dimension given in the other system. Make the students aware of the metric sizes of drafting paper.	Basic Drafting, Chas. A. Bennett Co., Inc., Unit 3 Drawing and Planning for Industrial Arts, Chas. A. Bennett Co., Inc., Section 1, Unit 2 Exploring Metric Drafting Basic Fundamentals, The Goodheart-Willcox Company, Inc., pp. 41-42 Drafting: Metric, American Technical Society, Unit 1

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
4. use the SI metric system of measurement.	Explain and demonstrate the correct use of metric scales. Provide the students with opportunities to use metric scales to develop the skill of measuring accurately.	The Basic Book of Drafting, American Technical Society, Unit 9 Metrics on the Drawing Board (transparencies), Administration Information Media Educational Aids

V. PLANNING AND DESIGN (C.)

Estimated Time: 6 hours

MAJOR OBJECTIVE: To gain an understanding of the relationship of planning and design to drafting and to develop skills in planning and design.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Integrate and emphasize the process of planning and design and related critical thinking throughout all drafting modules.	
A. PLANNING FOR DRAFTING The student should be able to:		
1. define drafting;	Show the students examples of the various types of drafting related to graphic arts, graphic communications, metalwork, woodwork, plastics, manufacturing, construction, electricity/electronics, power mechanics, and power/energy. Encourage groups of students to prepare posters, charts, or bulletin board displays about the various types of drafting. Have the students discuss and prepare a definition of drafting to be included in the vocabulary section of their notebooks.	Samples of drawings used by various industries DRAFTING: The process of putting ideas down on paper in the form of a drawing OR The preparation of drawings for things that are to be made or done
2. explain the purpose and the importance of drafting;	Point out that drafting deals with expressing ideas in the form of drawings such as pictures, working drawings, charts, or maps. Show the students that	Basic Drafting, Chas. A. Bennett Co., Inc., Unit 1

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	a study of drafting will aid them to read well, to understand how things operate and how to use them, to plan wisely and well, and to build or make things. Make the students aware of ways in which they can use drafting skills in all school subjects, in hobbies, in sports, and in activities in a home. Point out that drawings are graphic representations of real things. Consequently, drafting is a graphic language because it uses pictures to communicate thoughts and ideas. Explain that drafting is a universal language of industry, providing people with accurate and economical ways of developing, recording, and explaining ideas. Obtain copies of drawings made in other countries. To help the students recognize the universality of drafting, have them compare these drawings with Canadian drawings.	Exploring Industrial Education, 2nd ed., SI metric, McGraw-Hill Ryerson, Limited The Basic Book of Drafting, American Technical Society, Unit 1 Exploring Metric Drafting Basic Fundamentals, The Goodheart-Willcox Company, Inc., Unit 1 Drafting: Metric, American Technical Society, Unit 2
	Have the students outline the history of drafting from ancient times to the present, involving the use of a computer system, microfilm, and videotape, and indicating the influence of the metric measurement system.	Encyclopedia Newspapers, periodicals
3. define planning;	Have the students discuss and prepare a definition for planning to be included in the vocabulary section of their notebooks. Point out that planning is one of the activities related to the management of drafting projects. Make the students	PLANNING: The process of identifying and preparing details

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	aware that planning involves two important resources: people and things.	
4. develop an understanding of the importance of planning;	Explain the relationship between planning and drafting. Make the students aware that drafting is basic to the planning requisite for developing and carrying out simple and complex projects and related activities.	
5. identify the components of planning.	Emphasize that planning for drafting is a process of cooperation among many people using resources and equipment to meet the needs of society, business, and industry. List, discuss, and define the components of planning. Make the students aware of the importance and relationship of long-term and short-term planning for projects and related activities.	COMPONENTS OF PLANNING 1. Formulating 2. Researching 3. Designing 4. Engineering FORMULATING: The process of deciding what to make to meet needs RESEARCHING: The process of gathering facts to assist with decision-making DESIGNING: The process of developing and creating a plan ENGINEERING: The process of adding details to design and of scheduling for completion

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
B. DESIGN The student should be able to:		
1. recognize the fundamentals of design;	Review the definition of designing. Discuss and provide the students with information about the following principles of design: balance, proportion, emphasis, harmony. Make the students aware of the ways in which the principles of design apply to drafting. Show them examples or have them collect examples of drafting which illustrate each of the design principles. Have groups of students develop posters, charts, bulletin board displays, or illustrated reports about each of the design principles.	Drawing and Planning for Industrial Arts, 3rd ed., Chas. A. Bennett Co., Inc., Unit 22 The World of Drafting, McKnight and McKnight Publishing Company, Chapter 13
2. explain the relationship of design to strength, function, appearance, materials, cost, and quality;	Discuss the influence of the design guidelines on the design process. Have the students consider the following questions during the discussion: a) Strength. Will the design make the product strong and durable? b) Function. Does the design fit the purpose and fulfill the need for which it was planned? c) Appearance. Do the parts create interest, appear to belong together, provide proportion and balance, and present a pleasing appearance when brought together?	DESIGN GUIDELINES 1. Strength 2. Function 3. Appearance 4. Materials 5. Cost 6. Quality

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	d) Materials. Have the materials been used effectively and are their qualities emphasized to the fullest? e) Cost. Does cost relate to strength, function, appearance, materials, and quality of finished work? f) Quality. Is quality an inherent part of the finished work? Point out that these considerations are common and necessary to all designs and are interrelated.	
3. identify the steps in the design process.	Explain the steps in the design process. Make the students aware of the relationship between each of the steps and to the design process for the development of projects. Explain that ideas evolve from needs, research, group "brainstorming," and problems. Encourage the students to consider projects as design problems. Discuss and have the students answer the following questions related to design problems: a) State the problem. What is the purpose of the project and how will it be used? b) Think through the problem. What must the project do? How can it be done? What are some of the limitations to be considered? In what ways have other people solved similar problems?	STEPS OF DESIGN PROCESS 1. Identifying problems 2. Applying resources 3. Formulating ideas 4. Recording ideas 5. Refining the product 6. Presenting the product

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	c) Develop ideas. What type of sketches are needed to portray the ideas and to determine the materials required to carry out the ideas? d) Make models. Which ideas should be selected and what techniques should be used to prepare the models? e) Prepare working drawings. How should the working drawings be developed and prepared? f) Construct the project. How should the working drawings be used to complete the project?	
	Have the students keep notebook records of their ideas and those collected from periodicals, newspapers, advertisements, and reference books. Encourage the students to read and study publications on design to become familiar with the relationship between products and design. Point out that it takes time and practice to acquire the skill and knowledge to solve design problems. Make the students aware of the relationship of planning and design to sketching and the mechanics of drawing.	Newspapers, periodicals, reference books Exploring Metric Drafting Basic Fundamentals, The Goodheart-Willcox Company, Inc., Unit 25

VI. CONSUMERISM (C.)

Estimated Time: 3 hours

MAJOR OBJECTIVE: To explore and relate the complexity of the economy to drafting and consumer awareness.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Integrate and emphasize instruction, practice, critical thinking, and applications of consumerism to businesses and individuals throughout each module in the drafting area of study.	
A. ECONOMIC SYSTEMS AND DRAFTING The student should be able to:		
1. define economic system;	Explain the term economic system. Emphasize that the economic system refers to the following: - The way individual workers and managers, productive organizations such as factories or farms, and government agencies are linked together to form a system, a unit, or an organization; - The way decisions are made as to what the workers, production organizations, and government agencies will do to determine answers to basic economic questions each nation, province, and local community faces.	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	List and discuss the basic economic questions. Point out how these questions relate to drafting businesses, services, and products, and to consumers of these services and products. Make the students aware that political, social, religious, and moral systems influence economic systems and that economic systems change from one country to another and within a single country over a period of time. Point out that any type of economic system creates the use and consumption of goods and services.	BASIC ECONOMIC QUESTIONS 1. What to produce? 2. How to produce? 3. Who will receive the services and finished products? 4. How much to produce over a period of time?
2. explain the basic parts of economic systems;	Identify and discuss the basic parts required by economic systems to produce goods and services: inputs, processes, and outputs. Make the students aware of the relationship of these parts to drafting businesses, services, and products. Emphasize the following: a) Outputs are goods and services produced by an economic system. b) Processes are the work activities required to produce goods and services. c) Inputs are the resources required for the work activities to produce goods and services.	BASIC PARTS OF ECONOMIC SYSTEMS 1. Inputs 2. Processes 3. Outputs

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Have the students give examples of outputs, processes, and inputs for work activities related to drafting and its services and products.	
3. identify basic types of inputs.	Review the definition of inputs. List and discuss the basic types of inputs. Emphasize that the basic inputs are common to various types of enterprises/organizations such as schools, families, clubs, businesses. Discuss the relationship among the basic inputs and to the production of goods and services for consumption by businesses and individuals.	BASIC TYPES OF INPUTS 1. People 2. Knowledge and skills 3. Industrial resources 4. Utilities 5. Finance
B. DRAFTING AND CONSUMERISM The student should be able to:		
1. identify human needs;	Make the students aware of the importance of understanding the following human needs: physical, societal, intellectual, and emotional. Refer to Maslow's hierarchy of human needs. Relate these needs to the services and products of drafting.	Looking at the Consumer, Gage Publishing, Ltd. The Confident Consumer, The Goodheart-Willcox Company, Inc.
	Have the students identify some of the basic physical, societal, intellectual, and emotional needs. Point out the relationship between these needs and	MASLOW'S HIERARCHY OF HUMAN NEEDS 1. Physical needs 2. Security

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	drafting work activities, services, and products.	3. Love and acceptance 4. Esteem 5. Self-actualization
2. explain how drafting meets human needs;	Emphasize that drafting and various types of drafting services and products are available in different societal and economic systems. Have the students compile lists, prepare charts or bulletin board displays, or write illustrated reports on the different types of drafting services and products to explain society's and individuals' needs for each type. Explain that drafting services and products assist in meeting the basic needs of shelter, food, water, and clothing.	Charts Bulletin board displays Basic Architectural Drafting, South-Western Publishing Company, Unit I
3. recognize the relationship between drafting and the economy.	Make the students aware of the ways in which industries, businesses, and individuals use drafting and drafting services and products to produce goods and services for consumption by various sectors of the economy.	
C. DRAFTING AND THE MARKET PLACE		
	Discuss why it is important that prospective users of drafting services and products develop an understanding of the market place and its relationship to the economy.	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
The student should be able to:		
1. differentiate between needs and wants;	Have the students compile lists of drafting services and products that individuals may desire. Ask them to differentiate between needs and wants. Make the students aware that drafting businesses have needs and wants.	*The World of Business: A Canadian Profile*, Wiley Publishers of Canada, Limited, Chapter 18, Unit C NEEDS: The things an individual must have for basic survival WANTS: The things an individual would like to have for pleasure and comfort
2. recognize the concept of quality versus cost; 3. explain the role of supply and demand;	Discuss with students the following concepts: quality versus cost, influence of demand on supply and cost, the state of the economy, financing, and advertising. Relate these concepts to the users and producers of drafting services. Make the students aware of the relationship of these concepts to the following aspects of drafting services and products: - planning and design; - human needs; - availability and use of resources; - employment; - availability and choice of various services and products of drafting.	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
4. describe the effects of inflation;	Explain the major causes and effects of inflation. Make the students aware of the effect of inflation on individuals, industries and businesses in general, and on drafting businesses and related industries in particular.	
5. identify the positive and negative aspects of credit buying.	Discuss the direct and indirect costs of credit to individuals and businesses. Explain the advantages and disadvantages for consumers. Have the students compare the cost of items purchased on cash and credit terms by individuals and businesses.	Looking at the Consumer, Gage Publishing Limited, Chapter 3
D. ROLE OF DRAFTING IN CONSUMERISM The student should be able to:		
1. recognize the importance of the services and the products of drafting;	Discuss and make the students aware of the influence of drafting on businesses and individuals. Point out that services and products of drafting are very important and that every occupation requires the ability to read and understand drawings. Indicate that workers who construct homes and other buildings, make cars and other transportation vehicles, and produce television sets, must use drawings.	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
2. collect information and examples of specialized types of drafting;	Have the students discuss and prepare displays of specialized types of drafting. Make the students aware of the influence of drafting on the development of products and, consequently, on individuals and businesses who consume the products.	SPECIALIZED DRAFTING 1. Aerospace 2. Architecture 3. Automotive Styling 4. Electricity/electronics 5. Structural drafting 6. Technical drawings 7. Topographical drafting 8. Graphic arts/communications
3. explain the relationship between drafting and advertising.	Encourage the students to determine the relationship of drafting to graphic arts and graphic communications. Show the students how drafting, used to plan and design advertisements, influences the selection of products and services.	

VII. SKETCHING (C.)

Estimated Time: 4 hours

MAJOR OBJECTIVE: To recognize the significance of, to gain knowledge about, and to explore skills, techniques, and applications pertinent to freehand sketching for drafting.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Integrate and emphasize sketching throughout all modules in the drafting area of study. Emphasize the relationship of sketching to planning and design, measurement, mechanics of drawing, pictorials, and orthographics.	
A. PURPOSE OF SKETCHING The student should be able to:		
1. define sketching;	Show the students examples of various types of freehand sketching related to drafting and graphic communications. Have the students discuss and prepare a definition of sketching to be included in the vocabulary section of their notebooks.	Examples of sketches SKETCHING: Drawing without the aid of drafting instruments OR Expressing an idea on paper in the form of freehand drawings
2. describe the purposes of sketching;	Make the students aware that they can learn the fundamental principles of drafting and of job planning and layout in graphic communications through various types of freehand sketching. Point out that sketching will assist with rapid, correct presentation of information and the communication of ideas.	PURPOSES OF SKETCHING 1. Speeds development of new projects/products 2. Helps organize ideas 3. Assists with formulating ideas 4. Aids in recording ideas

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Explain that sketching requires simple equipment, and aids planning, clarity of thinking, and development of a sense of proportion. Have the students demonstrate an understanding of the purposes of sketching.	5. Helps in designing 6. Assists in finding graphic solutions to problems 7. Saves time and expense of instrument drawings
3. recognize the applications of sketching to industry and society.	Have the students identify and discuss the uses and the effects of sketching on the planning and development of the following: - various types, shapes, and sizes of products; - plays and techniques in sports activities; - directions to reach different locations; - design and enhancement of homes and other structures.	
B. BASIC TECHNIQUES OF SKETCHING The student should be able to:		
1. understand the need for using sequential steps in developing freehand sketching skills;	Discuss and have the students follow the steps requisite to the development of freehand sketching skills for drafting and graphic communications. Provide the students with opportunities to practice these steps.	STEPS FOR DEVELOPING SKETCHING SKILLS 1. Learning to copy 2. Studying pictures 3. Using objects for models 4. Creating sketches from thoughts *Drafting*, McKnight Publishing Company, Chapter 2

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
2. recognize and use basic factors of freehand sketching;	Explain, demonstrate, and have the students practice, use, and integrate the basic factors of freehand sketching for drafting and graphic communications.	BASIC FACTORS IN FREEHAND SKETCHING 1. Body position 2. Paper position 3. Pencil position 4. Arm motion 5. Single-stroke lines 6. Proportion
3. develop techniques for sketching lines and shapes;	Acquaint the students with the alphabet of lines and the meaning and special purpose of each type of line. Demonstrate and provide the students with opportunities for sketching each of the following lines in the alphabet of lines: construction lines, guide lines, border line, object line, hidden line, extension line, dimension line, center line, cutting plane line, section line. Demonstrate, show examples, and have the students practice freehand sketches of horizontal, vertical, and oblique lines; squares, rectangles, and angles; circles, arcs, and ellipses; hexagons and octagons. Point out they will use many of these lines and shapes during the development of designing, job planning, and layout for various types of graphic communications products.	Basic Drafting, Chas. A. Bennett, Inc., Unit 10 Exploring Industrial Education, 2nd ed., SI metric, McGraw-Hill Ryerson, Limited, Part 1, Unit 2 Exploring Metric Drafting Basic Fundamentals, The Goodheart-Willcox Company, Inc., Unit 2 The World of Drafting, McKnight and McKnight Publishing Company, Chapter 2 What Drawings Tell You; Arbitrary Standards; Sketching Lines, Circles and Arcs; Fastening the Paper; Drawing Lines and Angles; Alphabet of Lines; Drawing Circles and Squares (transparencies, Basic Skills Series), AIM
4. identify the reasons for lettering;	Make the students aware that lettering is the process of freehand drawing for the forming of the letters of the alphabet and numbers. Indicate that	Planning and Drawing for Industrial Arts, 3rd ed., Chas. A. Bennett Co., Inc., Section 1, Unit 7

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	printing is a requisite skill for completing forms and putting notes, dimensions, and other information on drawings because printing is easier to read and provides less chance for error.	Exploring Metric Drafting Basic Fundamentals, The Goodheart-Willcox Company, Inc., Unit 6 The Basic Book of Drafting, American Technical Society, Unit 3
5. develop techniques for lettering.	Demonstrate and have the students practice lettering. Emphasize shape, size, and slope of letters and the use of guidelines. Encourage the students to use guidelines and letters to label and identify notebook materials, products, projects, displays, posters, and charts. Have the students research CSA publications for information about lettering standards.	Basic Drafting, Chas. A. Bennett Co., Inc., Unit 12 Lettering, Block Letters, More Block Letters and Numbers (transparencies, Basic Skills Series), AIM CSA: Canadian Standards Association
C. SKETCHING VIEWS The student should be able to:		
1. identify the types of views;	Show the students illustrations of one- and two-view drawings. Explain that in choosing a view to sketch a drawing they should consider the following: a) Select the view that will best describe the object to be sketched. b) Use only the minimum number of views that will completely portray the size and shape of the object.	Illustrations of one- and two-view drawings

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	c) Choose the view that will avoid hidden feature lines. Point out that one-view drawings have two dimensions and two-view drawings have three dimensions. Have the students list objects or collect examples/illustrations of objects which require one-view and two-view drawings to portray. Make the students aware that some complex drafting and graphic communications projects require three-view and multi-view drawings.	Drafting: Metric, American Technical Society, Unit 17 Drafting Fundamentals, 5th ed., SI metric, McGraw-Hill Ryerson, Limited, Chapter 3 Basic Drafting, Chas. A. Bennett Co., Inc., Units 14, 17
2. sketch one-view and two-view drawings.	Demonstrate, using a step-by-step approach, the procedures for sketching one-view and two-view drawings. Have the students follow and complete each step. Provide the students with opportunities to use and apply the steps of freehand sketching to one-view and two-view drawings.	
D. ENLARGING AND REDUCING SKETCHES The student should be able to:		
1. describe the procedure for enlarging and reducing sketches;	Discuss some of the reasons why sketches may need to be enlarged and reduced. Explain the procedures for using the graph method for enlarging and reducing drawings.	Communication: Drafting, Prentice-Hall Inc., Unit 3 Exploring Metric Drafting Basic Fundamentals, The Goodheart-Willcox Company, Inc., Unit 2

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
2. use the graph method to enlarge and reduce sketches.	Demonstrate the procedures for using the graph method. Have the students design and use graph paper to enlarge and reduce sketches of objects and designs.	Drawing and Planning for Industrial Arts, Chas. A. Bennett Co., Inc., Section 1, Units 10, 11 Changing the Size with Squares (transparency, Basic Skills Series), AIM

VIII. MECHANICS OF DRAWING (C.)

Estimated Time: 4 hours

MAJOR OBJECTIVE: To obtain knowledge about drafting tools and materials; to develop skills in their use; and to apply knowledge and drafting techniques to lines, dimensioning, and hand lettering.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Integrate the mechanics of drawing, where applicable, to the drafting area of study. Encourage the students to develop critical thinking as it relates to the mechanics of drawing.	
A. DRAFTING TOOLS AND MATERIALS The student should be able to:		
1. recognize the importance of drafting tools;	Explain that special tools are required for technical drawings prepared by the drafting process. Indicate that each tool is designed for a special purpose and that the correct use and care of the tools will help the students produce more exact drawings quickly and accurately. Explain that the appearance and usefulness of the drawing depends mainly on the person preparing the drawing and how the person uses the tools, and not on the tools.	Drawing and Planning for Industrial Arts, Chas. A. Bennett Co., Inc., Section 3, Unit 24 "Drawing and Planning" (16 mm color film), Library, Manitoba Department of Education Drafting: Metric, American Technical Society, Units 3, 4, 5

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
2. identify the various types of drafting tools;	Identify and explain the application of the various types of drafting tools. Have the students prepare lists, charts, or displays identifying the drafting tools and their major uses. Plan field trips so students can observe equipment and techniques not available in the classroom.	Displays, charts, transparencies Drafting Tools (transparencies, Basic Skill Series), AIM The Basic Book of Drafting, American Technical Society, Unit 6
3. use drafting tools;	Demonstrate how to use drafting tools accurately and care for them effectively. Provide the students with exercises and projects to aid them in developing necessary techniques for using the tools. Emphasize and have the students practice safety precautions while using drafting tools.	Exploring Metric Drafting Basic Fundamentals, The Goodheart-Willcox Company, Inc., Unit 3 Drafting, McKnight Publishing Company, Chapter 4 DRAFTING TOOLS 1. Pencils and pens 2. Erasers 3. Erasing shields 4. Brushes 5. Compasses and dividers 6. T-squares 7. Protractors 8. Triangles 9. Scales 10. Templates 11. Drawing boards 12. Parallel straightedge
4. identify drawing materials;	Discuss and point out that special paper and materials are required for drafting processes. Indicate that each	TYPES OF MATERIALS 1. Drawing paper 2. Tracing paper

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	type and size of paper is designed for a special purpose. Acquaint the students with the various sizes of paper.	3. Vellum 4. Polyester film 5. Graph paper 6. Drafting tools
5. select and use the proper paper and related materials for drafting projects.	Show the students and have them practice the proper procedures for preparing the paper for drafting projects. Emphasize care and conservation of the various types of drawing papers.	The Basic Book of Drafting, American Technical Society, Unit 5 Drafting: Metric, American Technical Society, Unit 7
B. DRAFTING TECHNIQUES FOR LINES The student should be able to:		
1. draw basic lines;	Demonstrate and have the students use drafting instruments and equipment to draw horizontal, vertical, oblique, and parallel lines. Encourage them to compare the drawing of basic lines by sketching and by using drafting instruments.	Basic Drafting, Chas. A. Bennett Co., Inc., Units 4, 5
2. explain line conventions;	Have the students review the alphabet of lines presented in Module VII, Sketching. Point out the importance of being knowledgeable about the characteristics of the various lines and line conventions, and the correct way to use them in drafting in order to understand the language of industry.	Exploring Metric Drafting Basic Fundamentals, The Goodheart-Willcox Company, Inc., Unit 4 The Basic Book of Drafting, American Technical Society, Unit 10

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
3. draw the various lines classified as the alphabet of lines.	Emphasize that the lines can be drawn more uniformly and accurately with drafting instruments than by using sketching techniques. Demonstrate and have the students use drafting instruments and equipment to draw the various lines designated in the alphabet of lines. Point out that because each type of line has a specific meaning, it is essential that each line be drawn properly, be opaque and be uniform in width for its entire length.	Alphabet of Lines (filmstrips and cassettes), Copp Clark Pitman Drafting: Metric, American Technical Society, Unit 13
C. DIMENSIONING The student should be able to:		
1. recognize the importance of and the need for dimensioning;	Discuss and explain that dimensioning a drawing means to indicate sizes on the drawing. Show the students examples of dimensioned drawings and explain that to be completely useful, a drawing must show not only the shape but also the accurate size and special notes pertinent to construction of the object. Point out that dimensioning standards are the same all over the world. Discuss and show the students examples of aligned and unidirectional dual dimensioning.	The Basic Book of Drafting, American Technical Society, Unit 14 Basic Drafting, Chas. A. Bennett Co., Inc., Unit 13 Drafting: Metric, American Technical Society, Unit 19

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
2. read dimensions;	Have the students read and explain the dimensions indicated on dimensioned drawings.	Exploring Metric Drafting Basic Fundamentals, The Goodheart-Wilcox Co., Inc., Unit 8
3. dimension the overall measurements and features on the drawing of an object.	Discuss the rules and procedures for dimensioning. Demonstrate and have the students use drafting instruments and procedures for a two-dimensional drawing and dimensioning of an object. Encourage students to indicate dimensioning and to prepare special notes on drafting projects. Give the students copies of undimensioned drawings to dimension according to standard practices.	Drawing and Planning for Industrial Arts, Chas. A. Bennett Co., Inc., Section I, Unit 8 Dimensions and Symbols (filmstrips and cassettes), Copp Clark Pitman
D. HAND LETTERING The student should be able to:		
1. recognize the importance of and the need for neat, legible, accurate, and standardized lettering;	Review lettering presented in Module VII, Sketching. Explain that since lettering is used on drawings to provide dimensions and other descriptive information, it must be neat and legible in order to be read and understood and to enhance the appearance of the drawing. Have the students prepare a bulletin board display and critique the lettering in signs and posters used throughout the school and community.	The Basic Book of Drafting, American Technical Society, Unit 3 Basic Drafting, Chas. A. Bennett Co., Inc., Unit 12

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
2. use lettering on drawings.	Demonstrate and have the students practice and use hand lettering techniques on drawings and other assignments. Have them use lettering devices as enrichment projects.	Exploring Metric Drafting Basic Fundamentals, The Goodheart-Willcox Company, Inc., Unit 6

IX. PICTORIAL DRAWING (C.)

Estimated Time: 15 hours

MAJOR OBJECTIVE: To recognize the significance of and acquire related knowledge of pictorial drawing, and to develop related drafting skills.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
A. INTRODUCTION TO PICTORIAL DRAWING The student should be able to:		
1. recognize the purposes of pictorial drawings;	Discuss and show students examples of pictorial drawings. Emphasize that pictorial drawings are single-view picture drawings developed for the following purposes: a) To assist with the visualization of the shape of an object and with the explanation of design ideas; b) To use as descriptive aids for selling and explaining the assembly, use, and maintenance of products; c) To illustrate advertising literature and repair-service manuals to explain operation, parts, assembly, service, and repair. Make the students aware of the increasing need for pictorial drawings. Indicate that pictorial drawing, executed by freehand sketching and with drafting instruments, is basic to drafting knowledge and skill.	Examples of pictorial drawings PICTORIAL DRAWINGS: Drawings that look like photographs Exploring Metric Drafting Basic Fundamentals, The Goodheart-Willcox Company, Inc., Unit II Working Drawings: Pictorial Drawings (filmstrips and cassettes), Copp Clark Pitman 5 Types of Pictorial Drawing (transparency, Pictorial Drawing Series), Administration Information Media Educational Aids

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
2. identify the three most used types of pictorial drawings.	Show the students examples and have them identify and find illustrations of the three most used types of pictorial drawings: isometric, oblique, and perspective.	The Basic Book of Drafting, American Technical Society, Units 15-19 Basic Drafting, Chas. A. Bennett Co., Inc., Units 18-20 Drafting, McKnight Publishing Company, Chapter 5 Drafting: Metric, American Technical Society, Unit 6
B. ISOMETRIC DRAWINGS The student should be able to:		
1. describe isometric drawings;	Point out that an isometric drawing is one of the most effective ways to represent an object pictorially. Provide the students with copies of isometric drawings to read.	Examples of isometric drawings
2. construct simple isometric drawings.	Explain and demonstrate the steps in drawing an isometric view. Have the students practice drawing isometric axes and taking full-size measurements along each of the axes for the objects being drawn.	Isometric Drawing Procedures, Bird's and Worm's Eye Views (Isometric), Isometric Drawing Grid (transparencies, Pictorial Drawing Series), Administration Information Media Educational Aids
	Demonstrate and have the students practice using templates to construct isometric circles.	Isometric Drawing (transparency, Pictorial Drawing Series), Administration Information Media Educational Aids
	Have the students construct a series of isometric drawings, including blocks and cylinders, or have them complete isometric drawings of objects in the classroom.	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
C. OBLIQUE DRAWINGS		
The student should be able to:		
1. define oblique drawing;	Discuss, show examples, and have the students prepare a definition of oblique drawing.	OBLIQUE DRAWING: A simple pictorial drawing in which only the front surface shows the true size and shape
2. identify the two forms of an oblique drawing;	Point out that an oblique drawing is the quickest type of pictorial drawing to construct, and has two forms: cavalier and cabinet. Show the students examples of both forms and have them discuss the advantages and disadvantages of each. Explain the two methods of measurement for the third dimension, projection, as related to cavalier and cabinet drawings. Have the students read oblique drawings.	Oblique Drawing Procedures, Bird's and Worm's Eye View (Oblique), Oblique Drawing Grid (transparencies, Pictorial Drawing Series), Administration Information Media Educational Aids
3. draw a simple oblique view of an object.	Demonstrate and have the students practice the steps in constructing a cavalier and a cabinet drawing.	
D. PERSPECTIVE DRAWING		
The student should be able to:		
1. explain the purpose of perspective drawings;	Explain that perspective drawings are used by architects, artists, and drafters to show objects as they appear to the	Examples of perspective drawings

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	eye from certain locations. Sketch and show students examples of perspective drawings.	One-Point Drawing Perspective Drawing Procedures, Six Positions (One-Point Perspective), One-Point Perspective Drawing Grid, Two-Point Perspective Drawing Procedures, Three Positions (Two-Point Perspective), Two-Point Perspective Drawing Grid, View Drawing and Pictorial Drawing Comparison (transparencies, Pictorial Drawing Series), Administration Information Media Educational Aids
2. identify the types of perspective drawings;	Explain and have the students locate examples and prepare bulletin board displays of the following types of perspective drawings: one-point or parallel perspective, two-point or angular perspective, and three-point perspective. Ask the students to study and read perspective drawings.	Examples of perspective drawings
3. construct simple perspective drawings.	Demonstrate and have the students draw simple one-point, two-point, and three-point perspective drawings. Make the students aware of the main parts of a one-point perspective drawing: vanishing point, horizon, and object to be drawn.	STEPS TO DRAW ONE-POINT PERSPECTIVE DRAWINGS 1. Draw front view and select location of horizon and vanishing point 2. Draw corners to vanishing point 3. Estimate depth 4. Complete
	Discuss and have the students identify the main parts of a two-perspective drawing: two vanishing points, horizon, object to be drawn. Demonstrate the steps for the students to follow in completing two-point perspective drawings.	STEPS TO DRAW TWO-POINT PERSPECTIVE DRAWINGS 1. Estimate height of front corner and draw horizon and vanishing points 2. Draw ends straight to vanishing points
	Point out that the two-point perspective is the most common and can be drawn by sketching, plotting from two views, using a perspective grid, and by using a perspective board.	3. Estimate the width and length of the perspective drawing 4. Draw back corners to vanishing points 5. Erase extra lines 6. Darken

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Have the students execute two-point perspective drawings of various objects and types of furniture. Make the students aware that three-point perspective drawings are used to show objects, such as skyscrapers, when viewed from above; i.e., from an aircraft. Use three-point perspective drawings as enrichment projects.	

X. ORTHOGRAPHIC DRAWING (C.) Estimated Time: 15 hours

MAJOR OBJECTIVE: To explore the purpose of and to develop understanding and drafting skills in sectional views, auxiliary views, and pattern development, applicable to orthographic drawing.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
A. INTRODUCTION TO ORTHOGRAPHIC DRAWING The student should be able to:		
1. recognize the purpose of orthographic drawings;	Show or have the students collect examples of orthographic drawings. Explain that orthographic drawings are used most in industry, provide the basics for engineering drawings, illustrate several views of an object, and are used in technical drawings to describe shapes and objects exactly and completely. Make the students aware that objects must be represented on flat paper in such a way that the exact shape can be understood easily and produced quickly and accurately by craftspeople. Point out that through the use of orthographic drawing, all facets of an object can be understood and manufactured in the same way, by many people from varied backgrounds and countries.	ORTHOGRAPHIC DRAWING: Multiview or working drawing OR A representation by drawing a number of separate views of an object as seen from different positions, and by arranging the views in a systematic manner, projected one from the other Drafting: Metric, American Technical Society, Unit 17

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
2. draw top, front, and right-side views of an object;	Explain that three views (top, front, and right-side) are generally sufficient to explain the object being drawn, and that orthographic projections, similar throughout the world, aid in communicating information. Demonstrate and have the students use the standard procedures to draw the top, front, and right-side views of objects.	Exploring Metric Drafting Basic Fundamentals, The Goodheart-Willcox Company, Inc., Unit 7 Drafting, McKnight Publishing Company, Chapter 3 The World of Drafting, McKnight Publishing Company, pp. 114-115 Height, Width, and Depth of Views and Faces, Size Description Systems, Projection Planes, Orthographic Drawing Procedures (transparencies, Size and Shape Descriptions Series), Administration Information Media Educational Aids
3. position the views according to the rules for orthographic projection.	Explain and demonstrate the positioning of the views by using the standard drafting procedure, orthographic projection. Emphasize that keeping all orthographic views in the correct position is a universal law in technical drafting.	Working Drawings: Orthographic Projection (filmstrips and cassettes), Copp Clark Pitman
B. SECTIONAL VIEWS The student should be able to:		
1. understand the need for sectional views;	Explain that sectional views are used to show interior detail that is too complicated to be shown clearly by the use of outside views and/or hidden lines.	Examples of sectional views The World of Drafting, McKnight Publishing Company, pp. 130-134

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
		The Basic Book of Drafting, American Technical Society, Units 20, 21 Exploring Metric Drafting Basic Fundamentals, The Goodheart-Willcox Company, Inc., Unit 9
2. draw sectional views.	Have the students prepare bulletin board displays of various types of sectional views. Demonstrate and have the students follow the procedures for drawing various types of sectional views of objects. Encourage students to think how the objects would look if portions of them were actually removed.	TYPES OF SECTIONAL VIEWS 1. Full section 2. Half section 3. Offset section 4. Aligned section Section View Procedures (transparency, Size and Shape Descriptions Series), Administration Information Media Educational Aids Working Drawings: Special Views (filmstrips and cassettes), Copp Clark Pitman
C. AUXILIARY VIEWS The student should be able to:		
1. describe the function of auxiliary views;	Make the students aware that it is impossible to show the true shape and size of objects with angular and slanted surfaces, using only top, front, and right-side views. Explain that an additional view, called an auxiliary view, is required to show the true length and width of the angular surface.	Examples of auxiliary views The Basic Book of Drafting, American Technical Society, Unit 22 Basic Drafting, Chas. A. Bennett Co., Inc., Unit 23

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
		Exploring Metric Drafting Basic Fundamentals, The Goodheart-Willcox Company, Inc., Unit 10
2. draw auxiliary views.	Use transparencies and an overhead projector to demonstrate the procedures to project an auxiliary view from any view that shows the inclined surface as a line; i.e., a truncated solid. Point out that a view projected from a front view is called a front auxiliary, a view projected from a top view is called a top auxiliary, and a view projected from a right side is called a right-side auxiliary view.	MODELS OF TRUNCATED SOLIDS 1. Truncated prism 2. Truncated cylinder Drafting: Metric, American Technical Society, Unit 22
D. PATTERN DEVELOPMENT The student should be able to:		
1. explain the purpose of patterns and pattern development;	Discuss and have the students research and prepare an illustrated report about the purpose of patterns. Indicate that pattern drafting is a specialized branch of mechanical drawing. Point out that a pattern is a full-size outline/drawing that is drawn on or transferred to material to assist in the cutting, folding, bending or shaping, and assembling of the material.	Exploring Metric Drafting Basic Fundamentals, The Goodheart-Willcox Company, Inc., Unit 12 Drafting, McKnight Publishing Company, Chapter 1

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
2. recognize the use of pattern development;	Make the students aware that pattern development is a special form of drafting, important to various hobbies and industries. Explain and have the students prepare bulletin board displays illustrating the relationship of pattern development to the manufacturing of sheet metal and plastic products, clothing, leather products, cardboard boxes, envelopes and many other articles.	
3. prepare patterns for regular solids.	Review the importance of planning, designing, and developing an accurate pattern with drafting instruments before cutting and shaping material. Demonstrate and ask the students to follow the steps for developing and using the pattern to construct a cone, cylinder, pyramid, or prism.	MODELS OF REGULAR SOLIDS 1. Cone 2. Cylinder 3. Pyramid 4. Prism

XI. DRAWING INTERPRETATION (C.)

Estimated Time: 3 hours

MAJOR OBJECTIVE: To recognize the significance of drawing interpretation and to apply the process to manufacturing, construction, and assembly drawings.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Integrate drawing interpretation, where applicable, in the drafting area of study. Discuss and have the students research the following in relation to reading and interpreting drawings: a) The skills are necessary for some individuals and useful for others. b) More people require these skills than the drawing skills. c) The skills are requisite for anyone planning to enter technical careers in professional engineering and in the highly complex and increasingly technical manufacturing industries. d) In everyday life, the skills are helpful in understanding house plans; assembly, maintenance, and operating instructions for many manufactured products; and plans and specifications for many hobbies and spare-time activities.	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
A. MANUFACTURING DRAWINGS The student should be able to:		
1. recognize conventions related to manufacturing drawings;	Review conventional practices related to manufacturing drawings: standard symbols, line and material indicators, abbreviations, orthographic projections, dimensioning.	Exploring Metric Drafting Basic Fundamentals, The Goodheart-Willcox Company, Inc., Unit 17
2. apply drawing conventions to reading and interpreting manufacturing drawings.	Provide the students with copies of manufacturing drawings and have them answer questions related to the drawings. Explain the relationship between manufacturing drawings and manufacturing processes.	Machine and/or manufacturing drawings
B. CONSTRUCTION DRAWINGS The student should be able to:		
1. recognize conventions related to construction drawings;	Display or distribute drawings from the construction industry. Emphasize that the work of the construction trade is explained through the medium of drawings. Discuss and review the standard symbols, conventional pictures, abbreviations, material delineations, and dimensioning related to construction trade drawings. Make the students aware of the relationship of the standard symbols for	Construction drawings Drafting, McKnight Publishing Company, Chapter 6

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	electrical and plumbing work to the construction trade.	
2. read a simple floor plan for a house.	Provide or have the students obtain copies of floor plans of houses. Ask them to use the plans to locate dimensions and use the dimensions to calculate area of the house and of each room, and to determine the number of sheets of plywood required for flooring.	House plans Blueprint Reading for Construction, The Goodheart-Willcox Company, Inc.
C. ASSEMBLY DRAWINGS The student should be able to:		
1. recognize conventions related to assembly drawings;	Review the standard conventions related to assembly drawings.	
2. read and interpret assembly drawings.	Acquaint the students with the following uses of assembly drawings: a) to provide assembly information for manufacturing plants, sales literature, and parts catalogues; b) to show how the parts of a product fit together and relate to each other; c) to provide information related to the process of disassembling a product for servicing.	Exploring Metric Drafting Basic Fundamentals, The Goodheart-Willcox Company, Inc., Unit 13 Communication: Drafting, Prentice-Hall, Inc., Unit 6 Basic Drafting, Chas. A. Bennett Co., Inc., Unit 21 Instruction and assembly drawings for various products and objects

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Provide the students with assembly drawings to assist with the assembly and disassembly of puzzles, toys, models, furniture, and bicycles.	

XII. DRAWING REPRODUCTION (C.) Estimated Time: 2 hours

MAJOR OBJECTIVE: To gain an understanding and appreciation of the skills and processes related to the reproduction of drawings.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
A. INTRODUCTION TO DRAWING REPRODUCTION The student should be able to:		
1. describe the need for reproduction of drawings;	Inform the students that original drawings are rarely used as working drawings because they may be lost or would become worn, soiled, and difficult to read. Because the purpose of a drawing is to communicate data to others, the original drawing must be reproduced accurately, then stored, and copies must be distributed to those who need them.	Exploring Metric Drafting Basic Fundamentals, The Goodheart-Willcox Company, Inc., Unit 14
2. recognize the importance of drawing preparation.	Make the students aware that the quality of the original drawing is important to any form of reproduction and to the quality of the copy. Emphasize that drawing preparation is important to this concept.	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
B. METHODS OF DRAWING REPRODUCTION The student should be able to:		
1. identify the methods of reproducing drawings;	Show the students or have them obtain an example of each of the reproduction processes. Have the students make posters or bulletin board displays.	METHODS OF DRAWING REPRODUCTION 1. Blueprinting 2. Diazo process 3. Electrostatic process 4. Microfilming process 5. Photographic
2. explain the principles of the various methods of reproducing drawings;	Describe the basic concepts of the various processes and have the students compare the processes by preparing illustrated reports on the advantages and disadvantages of each. Have the students research the various diazo processes: ozalid, bruning copyflex, and pressure. Make the students aware of the use of the computer with the electrostatic process and for the transmitting of drawings and related data. Discuss other technological developments related to each of the processes.	*Basic Drafting*, Chas. A. Bennett Co., Inc., Unit 28 *Drafting Fundamentals*, McGraw-Hill Ryerson, Ltd., Unit 5-4

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
3. reproduce original drawings.	Have the students prepare pencil and ink tracings of their drawings, duplicate them by various processes, and compare the results.	

XIII. ELECTRONIC SYSTEMS (C.)

Estimated Time: 2 hours

MAJOR OBJECTIVE: To gain an understanding and appreciation of the influence on drafting of the functions of computers and computer-directed devices.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
A. INTRODUCTION TO ELECTRONIC SYSTEMS The student should be able to:		
1. explain the importance of the computer to drafting processes;	Discuss the influence on drafting processes of computers and computer-directed devices. Arrange field trips to businesses and industries to show the students how computers are used in various drafting processes. Have the students research information from newspapers, periodicals, and advertising literature. Emphasize that computers have enabled people to extend the ability of their brains to store and process information, but that computers are only capable of processing information according to given programs. Indicate that through the combined use of senses and brains, extended by computers and related devices, people can identify and work on problems related to drafting.	Newspapers, periodicals, and advertisements

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
2. recognize the relationship of the computer to the drafter.	Indicate that computer systems, computers, and computer devices are used to store information about a drawing, to display a drawing on a screen, and to prepare drawings when required. Make the students aware that computers are capable of showing different views of the same drawing, designing a tool, creating the drawings to build it, and running the machinery to make it. Explain that through a videotape it is possible to store and display drawings on television screens with a voice giving instructions and descriptions, and to make a print of a drawing from the tape.	
B. COMPUTER-DIRECTED DRAWING DEVICES The student should be able to:		
1. identify computer-directed drawing devices;	Have the students prepare a bulletin board display of computer-directed drawing devices.	Exploring Metric Drafting Basic Fundamentals, The Goodheart-Willcox Company, Inc., Unit 22 The Basic Book of Drafting, American Technical Society, p. 25

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
2. explain the purpose of the devices;	Explain that computer-directed drawing devices are used when the volume of graphic presentations make it impractical to perform the drafting manually. Have the students research and prepare illustrated reports on the purpose of these devices.	COMPUTER-DIRECTED SYSTEMS 1. Tracer system 2. Photo-composing system 3. Graphic display systems 4. Numerically controlled machine tools 5. Data tablets
3. describe the drafting functions of digitizers, plotters, and CRT video display units.	Arrange visits to businesses and industries to acquaint the students with the drafting functions of digitizers, plotters, and CRT video display units.	PLOTTER: Automatic drawing equipment controlled by tape or directly by a computer

graphic arts

CORE MODULES: Student Orientation, Safety, Careers, Measurement, Planning and Design, Consumerism, Design Concepts, Screen-Process Printing, Relief Printing, Black and White Photography, Process Photography, Planographic Printing, Intaglio Printing, Packaging and Presentation

OPTION MODULES: Colour Photography, Office Graphic Arts Equipment, Electronic Systems

I. STUDENT ORIENTATION (C.) Estimated Time: 3 hours

MAJOR OBJECTIVE: To explore and relate the significance of industrial arts to the needs of individuals, industry, and society.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	NOTE: Refer to Common Modules for Module I, Student Orientation.	Industrial Arts 7-9: Graphic Communications (Drafting, Graphic Arts, Graphic Communications), Module I, Student Orientation

II. SAFETY (C.)

Estimated Time: 4 hours

MAJOR OBJECTIVE: To develop a high degree of safety consciousness, practice, and application in the use of tools, equipment, and processes, through a wide range of exploratory experiences as they relate to individuals and to the production and services aspects of hobbies and industries.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	NOTE: Refer to Common Modules for Module II, Safety. Emphasize the following: a) Students learning the basics of graphic arts must learn safety precautions. b) The right way of doing a job is the safe way. c) The use of safety precautions is protection against injury. d) Safety is a matter of good common sense and good judgment. e) Applying safety precautions in all shop activities is essential to making them a part of regular work habits.	Industrial Arts 7-9: Graphic Communications (Drafting, Graphic Arts, Graphic Communications), Module II, Safety

III. CAREERS (C)

Estimated Time: 3 hours

MAJOR OBJECTIVE: To gain information about the general occupational characteristics of a variety of career fields and to match interests, abilities, preferences, and values to characteristics of various careers.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	NOTE: Refer to Common Modules for Module III, Careers. Integrate and emphasize career instruction throughout the graphic arts area of study by familiarizing the students with many careers, by providing a foundation for making career choices, and by encouraging self-evaluation in relation to various career opportunities and future goals.	Industrial Arts 7-9: Graphic Communications (Drafting, Graphic Arts, Graphic Communications) Module III, Careers Jobs in Printing (kit), Library, Manitoba Department of Education

IV. MEASUREMENT (C.)

Estimated Time: 3 hours

MAJOR OBJECTIVE: To gain knowledge and skills related to imperial and SI metric systems of measurement, and to the point system and line gauges pertinent to the processes of graphic arts.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Integrate and emphasize instruction, practice, and applications of measurement throughout the graphic arts area of study. Make the students aware that accurate measurement is vital to all phases of the printing process.	
A. INTRODUCTION TO MEASUREMENT The student should be able to:		
1. define measurement;	Discuss and have the students prepare a definition of measurement. Emphasize that measurement is a method used to communicate information about size, shape, distance, and weight. Explain that measurement is made by comparing an unknown quantity with a standard or known quantity. Have the students research and prepare an illustrated report on how the system of measurement developed from ancient times to the present.	MEASUREMENT: A method of communicating size, shape, distance, and weight The World Book, World Book-Childcraft International, Vol. 13, pp. 280-284

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
2. explain the importance of and the need for measurement;	Discuss the relationship between good workmanship and accurate measurements. Have the students identify ways in which measurement applies to various aspects of graphic arts. Point out the application of measurement to the various types of graphic arts processes.	Drawing and Planning for Industrial Arts, Chas. A. Bennett Co., Inc., Unit 31
3. recognize the need for standards.	Point out that standards for graphic arts have developed over the years and have been agreed upon by people and organizations, such as ISO, with representation from many industries. Make the students aware of the relationship of standards to the various types of measurement for graphic arts.	ISO: International Organization for Standardization Understanding Graphic Arts, South-Western Publishing Company, Part III, Unit 12
B. MEASUREMENTS FOR GRAPHIC ARTS The student should be able to:		
1. identify the measurement systems for graphic arts;	Explain and discuss the three measurement systems applicable to graphic arts. Indicate that the imperial and metric systems of measurement pertain to the size and weight of paper products used in the graphic arts industry, and are expressed in inches and pounds and millimetres and grams, respectively. Explain that because the linear system of inches and fractions of inches is too cumbersome to measure type, a special	MEASUREMENT SYSTEMS FOR GRAPHIC ARTS 1. Imperial system 2. Metric system 3. Point system Graphic Arts, 5th ed., Chas. A. Bennett Co., Inc., Appendix Understanding Graphic Arts, South-Western Publishing Co., pp. 59-60

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	system, called the "point system," was developed. Explain how the metric system of measurement relates to half-tone screens, the measures of volume for mixing ink, newspaper layouts, the sizes of envelopes and business forms, paper sizes, printing plates, and book sizes, and to the emergence of computer-assisted phototypesetting. Have the students prepare a report on the history of the development of the point system.	Graphic Arts Fundamentals, The Goodheart-Willcox Company, Inc., pp. 44-45 The Basic Book of Graphic Arts, American Technical Society, Unit 4 Graphic Arts, McKnight Publishing Company, Chapter 3
2. explain the point system;	Define point system. Identify and define the units of the point system. Make the students aware of the relationship among the units of measurement in the printer's point system. Inform the students that an agate line is a standard measurement for depth of columns of advertising space.	POINT SYSTEM: Printer's system of measurement based on the point PRINTER'S POINT SYSTEM OF MEASUREMENT 1 point = 1/72 inch 1 inch = 72 points 12 points = 1 pica 6 picas = 1 inch 6 points (1/2 pica) = 1 nonpareil 5 1/2 points = 1 agate
3. use a line guage.	Explain and demonstrate the correct use of the line gauge. Draw the students' attention to the two scales in the line gauge: an inch scale and a pica scale. Point out that with the development of the SI metric system, the line gauge may have millimetre graduations along one side. Provide the students with opportunities to use the line gauge to measure type and prepare layouts.	LINE GAUGE: A printer's measuring rule used to determine point and pica measurement Graphic Arts, McKnight Publishing Company, Chapter 3 The Basic Book of Graphic Arts, American Technical Society, Unit 4

V. PLANNING AND DESIGN (C)

Estimated Time: 20 hours

MAJOR OBJECTIVE: To acquire an understanding of the relationship of planning and design to graphic arts; and to develop skills in planning and design.

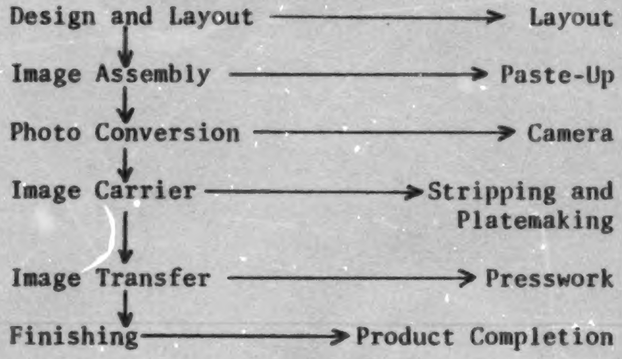
TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Integrate and emphasize planning and design throughout all modules in the graphic arts area of study.	
A. PLANNING FOR GRAPHIC ARTS The student should be able to:		
1. define graphic arts;	Show the students examples of various types of graphic arts products. Encourage groups of students to prepare posters, charts, bulletin board and classroom displays about the various types of graphic arts products. Have the students discuss and prepare a definition of graphic arts to be included in the vocabulary section of their notebooks.	GRAPHIC ARTS: Printing and allied crafts including all activities closely related to the printing and publishing field OR The science and the art of printing, papermaking, binding, and photography, including all types of writing, drawing, and printing
2. explain the purpose and the importance of graphic arts;	Point out that the products of graphic arts are everywhere and that the various forms of printed materials have a great influence on businesses and society.	What is Graphic Arts? (transparencies), Administration Information Media Educational Aids

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Make the students aware that ideas, thoughts, beliefs, etc., are recorded for present and future use through the processes and techniques of graphic arts. Show them examples or have them collect examples and prepare displays of the many types of printed images, such as newspapers, magazines, books, T-shirts, photographs, wallpaper, stationery, maps, advertisements, postage stamps, printed money, business forms. Have the students discuss and prepare reports on how the many types of printed materials influence and are used by people. Arrange visits to museums and graphic arts businesses to aid the students in developing an appreciation of past, present, and possible future developments in graphic arts.	Graphic Arts Fundamentals, The Goodheart-Willcox Company, Inc., Unit 1 The Basic Book of Graphic Arts, American Technical Society, Unit 1 Graphic Arts, McKnight Publishing Company, Chapter 1
	Have the students trace the historical development of the 6000-year history of graphic arts from ancient times to the present, including the use and influence of computer technology.	Encyclopedias Historical Highlights (transparencies), Administration Information Media Educational Aids Introduction to Graphic Arts, American Technical Society, Units 1 and 2 Understanding Graphic Arts, South-Western Publishing Company, Unit 2

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
3. define planning;	Have the students discuss and prepare a definition for planning to be included in the vocabulary section of their notebooks. Point out that planning is a key element in managing and carrying out graphic arts processes and projects. Make the students aware that all planning involves two important resources, people and things.	PLANNING: The process of identifying and preparing details
4. develop an understanding of the importance of planning;	Explain the relationship between planning and the processes in graphic arts. Make the students aware of the necessity of planning to carry out the processes of graphic arts related to the four stages of graphic messages.	STAGES OF GRAPHIC MESSAGES 1. Design 2. Composition 3. Reproduction and production 4. Binding, finishing, packaging
5. identify the components of planning.	Emphasize that planning for graphic arts is a process of cooperation of many people using resources and equipment to meet the needs of society, business, and industry.	COMPONENTS OF PLANNING 1. Formulating 2. Researching 3. Designing 4. Engineering
	List, discuss, and define the components of planning. Make the students aware of the importance and relationship of long-term and short-term planning to graphic arts.	FORMULATING: The process of deciding what to make to meet needs RESEARCHING: The process of gathering facts to assist with decision-making
	Emphasize the importance of scheduling and coordinating the processes in the four stages of producing finished graphic arts projects.	DESIGNING: The process of developing and creating a plan ENGINEERING: The process of adding details to design and of scheduling for completion

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
B. DESIGN The student should be able to:		
1. recognize the fundamentals of design;	Review the definition of designing. Have the students define design. Point out that designing and the use of pictorial elements are important steps in arriving at a suitable product. Discuss the following principles of design: balance, proportion, emphasis, harmony, and rhythm. Make the students aware of the ways in which the principles of design apply to all graphic arts processes. Show the students examples or have them collect examples of various types of graphic arts which illustrate each of the principles. Have groups of students develop posters, charts, bulletin board displays, or illustrated reports about each of the design principles and their application to graphic arts.	DESIGN: An arrangement of pictorial elements (lines, shapes, forms, colors, values, and textures) which convey messages Drawing and Planning for Industrial Arts, 3rd ed., Chas. A. Bennett Co., Inc., Unit 22 Design (transparencies), Administration Information Media Educational Aids Graphic Arts, McKnight Publishing Company, Chapter 2 The Basic Book of Graphic Arts, American Technical Society, Unit 6 Graphic Arts Fundamentals, The Goodheart-Willcox Company, Inc., Unit 13
2. explain the relationship of design to strength, function, appearance, materials, cost, and quality;	Discuss and make the students aware of the influence of the design guidelines on the design process. Have the students consider the following: a) Strength. Will the design make the product strong and durable?	DESIGN GUIDELINES 1. Strength 2. Function 3. Appearance 4. Materials 5. Cost 6. Quality

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	b) Function. Does the design fit the purpose for which it was planned? c) Appearance. Do the parts create interest, appear to belong together, provide proportion in balance, and present a pleasing appearance when brought together? d) Materials. Have the materials been used effectively and are their qualities emphasized to the fullest? e) Cost. Does cost relate to strength, function, appearance, materials, and quality of finished work? f) Quality. Is quality an inherent part of the finished work? Point out that these guidelines are interrelated, and are common and necessary to all designs executed by graphic arts processes.	
3. identify the steps in the design process.	Explain and provide information about steps in the design process. Make the students aware of the relationships between each of the steps, their relation to the design process and to the work flow and processes of graphic arts in the development of projects. Encourage the students to consider projects as design problems. Discuss and have the students answer the following questions related to design problems:	STEPS OF DESIGN PROCESS 1. Identifying problems 2. Applying resources 3. Formulating ideas 4. Recording ideas 5. Refining the product 6. Presenting the product Understanding Graphic Arts, South-Western Publishing Company, Part I, Unit 3

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	a) State the problem. What is the purpose of the project and how will it be used? b) Think through the problem. What must the project do? How can it be done? What are some of the limitations to be considered? In what ways have other people solved similar problems? c) Develop ideas. What type of sketches are needed to portray the ideas and to determine the materials required to carry out the ideas? d) Make models. Which ideas should be selected and what techniques should be used to prepare the models? e) Prepare comprehensive layouts. How should the comprehensive layout be developed and prepared? f) Construct the project. How should the comprehensive layout be used throughout the work flow and the related graphic arts processes? Have the students place in their notebooks materials and illustrations about graphic arts work flow and related processes. Make the students aware of the relationship of planning and design to measurement, design concepts, and the various processes of graphic arts.	GRAPHIC ARTS WORK FLOW AND RELATED PROCESSES  Design and Layout Layout Image Assembly Paste-Up Photo Conversion Camera Image Carrier Stripping and Platemaking Image Transfer Presswork Finishing Product Completion

VI. CONSUMERISM (C.) Estimated Time: 3 hours

MAJOR OBJECTIVE: To explore and to relate the complexity of the economic system and the economy to graphic arts and consumer awareness.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Throughout each module, integrate instruction, practice, and application of consumerism to businesses and individuals. Discuss the relationship of choices made and activities carried out by businesses and individuals to the use and conservation of resources, and cost of goods and services.	
A. ECONOMIC SYSTEMS AND GRAPHIC ARTS The student should be able to:		
1. define economic system;	Explain the term economic system. Emphasize that the economic system refers to the following: a) The way individual workers and managers, productive organizations such as factories or farms, and government agencies are linked together to form a system, a unit, or an organization; b) The way decisions are made as to what the workers, productive organizations, and government agencies	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	will do to determine answers to basic economic questions each nation, province, and local community faces.	
	List and discuss the basic economic questions. Point out how these questions relate to graphic arts industries, products and services, and to consumers of these products and services.	BASIC ECONOMIC QUESTIONS 1. What to produce? 2. How to produce? 3. Who will receive the finished products? 4. How much to produce over a period of time?
	Explain the purpose and use of consumer surveys to attempt to answer the basic economic questions.	
	Make the students aware that political, social, religious, and moral systems influence economic systems, and that economic systems change from one country to another and within a single country over a period of time.	
	Point out that any type of economic system creates the use and consumption of graphic arts goods and services.	
2. explain the basic parts of economic systems;	Identify and discuss the basic parts required by economic systems to produce goods and services through graphic arts processes: inputs, processes, and outputs. Make the students aware of the relationship of these parts to graphic arts businesses, services, and products. Emphasize the following:	BASIC PARTS OF ECONOMIC SYSTEMS 1. Inputs 2. Processes 3. Outputs

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	a) Outputs are goods and services produced by an economic system. b) Processes are the work activities required to produce goods and services. c) Inputs are the resources required for the work activities to produce goods and services. Have the students give examples of outputs, processes, and inputs for work activities related to graphic arts processes, services, and products.	
3. identify basic types of inputs.	Review the definition of inputs. List and discuss the basic types of inputs. Emphasize that the basic inputs are common to various types of enterprises/organizations such as schools, families, clubs, businesses. Discuss the relationship among the basic inputs and their application to graphic arts processes.	BASIC TYPES OF INPUTS 1. People 2. Knowledge and skills 3. Industrial resources 4. Utilities 5. Finance
B. GRAPHIC ARTS AND CONSUMERISM The student should be able to:		
1. identify human needs;	Make the students aware of the importance of understanding the following human needs: physical, societal, intellectual, and emotional. Refer to Maslow's hierarchy of human needs.	Looking at the Consumer, Gage Publishing Ltd. The Confident Consumer, The Goodheart-Willcox Company, Inc.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Relate these needs to the processes of graphic arts. Have the students identify some of the basic physical, societal, intellectual, and emotional needs. Point out the relationship between these needs and graphic arts work activities, services, and products.	MASLOW'S HIERARCHY OF HUMAN NEEDS 1. Physical 2. Security 3. Love and acceptance 4. Esteem 5. Self-actualization
2. explain how graphic arts meet human needs;	Emphasize that graphic arts and various graphic arts products are available in different societal and economic systems. Have the students compile lists, prepare bulletin board displays, or write illustrated reports on the different types of services and products processed by graphic arts, to explain the need of society and individuals for each type. Explain how the processing of graphic arts services and products assists individuals in meeting the basic needs of shelter, food, water, and clothing.	TYPES OF PRODUCTS IN GRAPHIC ARTS 1. Newspapers 2. Magazines 3. Books 4. Letterheads and envelopes 5. Theatre tickets 6. Bank cheques 7. Paper money 8. Postage stamps 9. Posters 10. Invitations 11. Greeting cards 12. Lettering on cans, bottles, T-shirts, buttons 13. Signs on buses 14. Felt pennants 15. Advertising matter on packages 16. Printed billboards 17. Invoices, statements 18. Maps 19. Charts 20. Catalogues 21. Candy wrappers 22. Circuits for electronic devices

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
3. recognize the relationship between graphic arts and the economy.	Discuss the importance of various types of industrial and business activities to the national, provincial, regional, and local levels of the economy. Have the students investigate the effects of industrial and business activities on employment and businesses related to graphic arts. Make the students aware of the ways in which industries, businesses, and individuals use graphic arts and graphic arts processes to produce goods and services for consumption by various sectors of the economy.	CONSUMERS OF GRAPHIC ARTS 1. All occupations and professions 2. Product engineering businesses 3. Architectural or construction businesses 4. Manufacturing businesses 5. Users of various products in graphic arts
C. GRAPHIC ARTS AND THE MARKET PLACE		
	Point out how important it is for prospective users of graphic arts processes to develop an understanding of the market place and its relationship to the economy.	
The student should be able to:		
1. differentiate between needs and wants;	Have the students compile lists of graphic arts processes individuals may desire. Differentiate between needs and wants. Make the students aware of businesses that need and want the services and products of graphic arts. Discuss the needs and wants of businesses.	The World of Business: A Canadian Profile, Wiley Publishers of Canada, Limited, Chapter 18, Unit C NEEDS: The things an individual must have for basic survival WANTS: The things an individual would like to have for pleasure and comfort

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
2. recognize the concept of quality versus cost;	Discuss with students the following concepts: quality versus cost, influence of demand on supply and cost, the state of the economy, financing, and advertising. Relate these concepts to users and producers of graphic arts processes.	
3. explain the role of supply and demand;	Make the students aware of the relationship of the above concepts to the following aspects of graphic arts processes: - planning and design; - human needs; - availability and use of resources; - employment; - availability and choice of the various processes of graphic arts.	
4. describe the effects of inflation;	Explain the major causes and effects of inflation. Make the students aware of the effects of inflation on individuals, industries, and businesses in general, and graphic arts industries and related businesses in particular.	
5. identify the positive and negative aspects of credit buying.	Point out the direct and indirect costs of credit to individuals and businesses. Explain the advantages and disadvantages of credit buying for consumers. Have the students compare the cost of products and services purchased on cash and credit terms by individuals and businesses. Relate these costs to graphic arts processes.	Looking at the Consumer, Gage Publishing Ltd., Chapter 3

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
D. ROLE OF GRAPHIC ARTS IN CONSUMERISM		
The student should be able to:		
1. recognize the importance of graphic arts processes in preparing printed materials;	With the students, discuss the influence of graphic arts processes on their lives.	
2. collect information and examples of advertisements;	Have the students discuss and prepare displays of various types of advertisements prepared by graphic arts processes. Encourage them to assess their reactions to different types of advertisements. Acquaint the students with the advertising code and its influence on advertising.	
3. explain the relationship between graphic arts and advertising.	Encourage the students to determine the relationship of graphic arts to advertising. Show the students how graphic arts processes, used in the production of advertisements, influence the selection of products and services.	

VII. DESIGN CONCEPTS (C.)

Estimated Time: 4 hours

MAJOR OBJECTIVE: To recognize the importance of design factors, design elements, design principles, pre-printed and photo composition; and to use all these design concepts in the preparation of layouts for printing processes.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
A. DESIGN FACTORS The student should be able to:		
1. define design;	Explain that a design is a plan, a means to an end, and a procedure for making choices based on certain criteria.	DESIGN: A plan for selecting and arranging type and illustration elements included in a printed product
2. describe the purposes of graphic design;	Point out that graphic design is the art of planning the layout of printed work for the following purposes: a) to attract the reader's attention; b) to be easily read and understood; c) to make the reader remember.	Graphic Design (color filmstrips, cassettes, program guide), Prentice-Hall Media
3. identify design factors.	Discuss how the two factors (elements of design and principles of design) are used to achieve the purposes of graphic design.	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
B. ELEMENTS OF DESIGN The student should be able to:		
1. identify the elements of design;	List, discuss, and define the elements of design. Show the students examples. Have them prepare bulletin board displays or posters for each of the elements.	ELEMENTS OF DESIGN 1. Line 2. Form or shape 3. Mass 4. Color 5. Texture
2. explain the purpose of the elements of design;	Make students aware that the elements of design are all the things used on a page to present a message so that people will read it.	
3. use the elements of design.	Show the students how to use the elements of design effectively in various types of printed products. Encourage the students to study designs they like and to experiment, individually and in groups, in using the elements of design to produce posters, tickets, letterheads, or other printed products.	
C. PRINCIPLES OF DESIGN The student should be able to:		
1. identify the principles of design;	List, discuss, and define each of the principles of design. Have the stu-	PRINCIPLES OF DESIGN 1. Balance

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	dents collect examples of various printed products to illustrate the use of the principles of design, and prepare bulletin board displays.	2. Harmony 3. Proportion 4. Rhythm 5. Emphasis 6. Perspective 7. Movement 8. Unity
2. describe the purposes of the principles of design;	Point out the relationship of the elements of design to the principles of design by indicating that the principles are the things a designer does with the elements to prepare attractive and effective messages/products in graphic communications.	Introduction to Graphic Arts, American Technical Society, Unit 10 Graphic Arts, 5th ed., Chas. A. Bennett Co., Inc., Chapter 4
3. use the principles of design.	Show the students how to use design principles to prepare a design for a printed product. Have the students select professionally prepared designs to identify and explain how the designers used the design principles.	Design (transparencies), Administration Information Media Educational Aids Understanding Graphic Arts, South-Western Publishing Company, Part I, Unit 3
D. DESIGN AND LAYOUT The student should be able to:		
1. describe the function of layout;	Define layout. Emphasize that the function of layout is to reflect the visual appearance of a job to be printed, by showing the arrangement of type, illustrations, and ornamentations.	Modern Graphic Arts Paste-Up, American Technical Society LAYOUT: The drawing or sketch of a proposed printed product

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
		OR A plan for arranging type and illustration elements to be included in a printed product
2. identify types of layout;	Show the students examples of the various types of layout. Have the students prepare charts, posters, or bulletin board displays on each of the types of layout.	TYPES OF LAYOUT 1. Thumbnail sketch 2. Rough layout 3. Comprehensive layout 4. Mechanical layout
3. describe the characteristics of the types of layout;	Have the students study each of the types of layout, and list and describe the characteristics of each. Emphasize the following: a) Thumbnail sketches, used to explore and develop ideas, are completed quickly in reduced size to present overall design features. b) Rough layout, a refinement of the best thumbnail sketch, shows the space relationships among all the elements in a printed job, drawn to size. c) Comprehensive layout, an exact size prototype of the proposed product, serves as a guide or blueprint to those who produce the printed product. d) Mechanical layout, often called a paste-up, is an exact duplicate of the printed product.	The Basic Book of Graphic Arts, American Technical Society, Chapter 1, Unit 6 Layout (transparencies), Administration Information Media Educational Aids

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
4. produce the various types of layouts.	Demonstrate the preparation of the various types of layouts. Have the students prepare the various types for a product of their choice. Ask the students to include the following information on the comprehensive layout: message to be printed, arrangement of type and illustrations, type sizes and styles, colors to be used, color and size of printing stock, and number of copies to be printed. Emphasize the importance of accuracy and the development of an attractive design.	
E. PREPRINTED AND PHOTO COMPOSITION The student should be able to:		
1. identify the various types of pre-printed aids;	Identify the various types of preprinted aids for preparing layout, and explain their uses. Relate to design elements and design principles.	PREPRINTED AIDS 1. Transfer materials 2. Pressure-sensitized materials 3. Clip art
2. describe the use of photographs in layouts;	Point out that photographs often are used to add clarity and interest to a printed message. Explain the purpose of the subject and predicate elements of a photograph. Show the students several photographs and have them identify the subject and predicate	SUBJECT: The main element in a photograph, or what the photograph is about PREDICATE: Tells something about the subject, or shows what the subject is doing

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	elements. Discuss sources of photographs for reproduction. Show the students how to incorporate photographs into layouts for printed messages. Relate to design elements and design principles.	
3. prepare layouts using pre-printed and/or photo composition.	Have the students prepare a layout of a poster or a sign for a school activity, using pre-printed aids and/or photo composition. Encourage the students to incorporate the elements and principles of design into the layout.	

VIII. SCREEN-PROCESS PRINTING (C.)

Estimated Time: 10 hours

MAJOR OBJECTIVE: To recognize the significance of screen-process printing and to develop skills and knowledge related to preparing and using hand-cut paper and film stencils, and indirect and direct photographic stencils in screen-process printing.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Explain that screen-process printing is a process using a porous (open) stencil as the image carrier, and involves both hand and machine techniques. It requires the following basic materials: stencil, screen fabric, frame, printing base, squeegee, and ink. This printing procedure is known by many other names: screen printing, silkscreen printing, stencil printing, and mitrography.	
A. HISTORICAL DEVELOPMENT AND MODERN APPLICATIONS The student should be able to:		
1. outline the historical development of screen-process printing;	Have students research and prepare an illustrated report about the development of screen-process printing from its origin to the present.	"Blue Sky Thinking" (color film), Library, Manitoba Department of Education Introduction to Graphic Arts, American Technical Society, Unit 30

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
2. identify modern applications of screen-process printing;	Have the students research and prepare a display of examples of screen-printed products which demonstrates the modern applications of screen-process printing.	SCREEN-PRINTED PRODUCTS 1. Textiles 2. Containers 3. Posters 4. Book covers
3. identify various types of stencils used in screen-process printing.	Discuss and show students examples of the four most commonly used stencils: hand-cut paper stencils, hand-cut film stencils, photographic stencils, and hand-painted stencils.	*The Basic Book of Graphic Arts*, American Technical Society, Unit 5
B. HAND-CUT PAPER STENCIL PROCESS The student should be able to:		
1. list the basic steps involved in cutting paper stencils;	Discuss and have the students list in proper sequence the basic steps in cutting a paper stencil.	*Graphic Arts*, 5th ed., Chas. A. Bennett Co., Inc., Chapter 6
2. cut paper stencils;	Explain the characteristics and advantages of a hand-cut paper stencil as a process of graphic arts and to communicate graphic messages. Demonstrate the method of preparing a paper stencil. Emphasize safety precautions. Have the students prepare a paper stencil of a design.	*Graphic Arts*, McKnight Publishing Company, Chapter 5 *Understanding Graphic Arts*, South-Western Publishing Company, Part II, Unit 10

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
3. print copies from a hand-cut paper stencil.	Discuss the preparation, maintenance, safety precautions, and clean-up procedures related to screen-printing equipment. Demonstrate the sequence of operations for printing copies from a hand-cut paper stencil. Have the students adhere hand-cut paper stencils to a screen and print.	Graphic Arts Fundamentals, The Goodheart-Willcox Company, Inc., Unit 8
C. HAND-CUT FILM STENCIL PROCESS The student should be able to:		
1. identify the types of hand-cut film stencils;	Show the students examples and discuss the characteristics and advantages of two types of hand-cut film stencils: water soluble and lacquer soluble.	The Basic Book of Graphic Arts, American Technical Society, Unit 5
2. cut film stencils;	Demonstrate the sequence of basic steps for hand cutting a film stencil. Emphasize the need for following safety precautions. Have the students design and prepare hand-cut film stencils of the school crest for use in printing on decals, T-shirts, and letterheads. Have small groups of students prepare designs and stencils for mass-produced printing on coasters, club crests, pennants, team and/or school jackets.	Graphic Arts, McKnight Publishing Company, Chapter 5 Understanding Graphic Arts, South-Western Publishing Company, Part II, Unit 10 Graphic Arts Fundamentals, The Goodheart-Willcox Company, Inc., Unit 8

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
3. print copies from a hand-cut film stencil.	Discuss the preparation, maintenance, safety precautions, and clean-up procedures related to screen-printing equipment. Demonstrate the sequence of operations for printing copies from hand-cut film stencils. Have the students use the proper sequence to adhere and print copies from their hand-cut film stencils.	
D. PHOTOGRAPHIC STENCIL PROCESS The student should be able to:		
1. identify the types of photographic stencils;	Show the students examples and discuss the characteristics of two types of photographic stencils: indirect and direct. Describe the major difference between an indirect and direct photographic stencil.	The Basic Book of Graphic Arts, American Technical Society, Unit 5
2. explain the indirect photographic stencil method;	Discuss, demonstrate, and have the students list the proper sequence of procedures and the use of materials for preparing an indirect photographic stencil. Emphasize safety precautions.	Graphic Arts, McKnight Publishing Company, Chapter 5
3. expose and develop an indirect photographic stencil;	Have the students follow the correct sequence and use the requisite materials for exposing and developing indirect photographic stencils. Emphasize the importance of following the manu-	MATERIALS FOR INDIRECT PHOTOGRAPHIC STENCILS 1. Indirect photo film 2. Screens

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	facturer's recommendations when using the materials. Have the students prepare indirect photographic stencils for a school or private crest, a cartoon drawn with India ink, and an image for a poster or a T-shirt.	3. Transparent positives 4. Light source 5. Ink 6. Cleaning supplies
4. print copies of an indirect photographic stencil;	Discuss the preparation, maintenance, safety precautions, and clean-up procedures related to screen printing equipment. Demonstrate and have the students use the proper sequence of operations to adhere and print copies from indirect photographic stencils.	
5. explain the direct photographic stencil method;	Demonstrate, then ask students to describe, the proper sequence of procedures and the use of materials for preparing a direct photographic stencil. Emphasize safety precautions.	Understanding Graphic Arts, South-Western Publishing Company, Part II, Unit 10 MATERIALS FOR DIRECT PHOTOGRAPHIC STENCILS 1. Emulsion 2. Inks 3. Screens 4. Transparent positives 5. Light source 6. Cleaning supplies
6. expose and develop a direct photographic stencil;	Have the students follow the correct sequence and use the requisite materials to expose and develop direct photographic stencils. Emphasize the importance of following the	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	manufacturer's recommendations when using materials. Have the students prepare direct photographic stencils for several types of designs.	
7. print copies from a direct photographic stencil.	Discuss the preparation, maintenance, safety precautions, and clean-up procedures related to screen-printing equipment. Demonstrate and have the students use the proper sequence of operations to adhere and print copies from direct photographic stencils.	Graphic Arts Fundamentals, The Goodheart-Willcox Company, Inc., Unit 8
E. MULTICOLORED SCREEN-PRINTING PROCESS The student should be able to:		
1. describe the multicolored screen-printing process;	With the students, discuss the process of making multicolored prints by means of screen-process printing. Show the students examples of multicolored prints prepared by screen-process printing.	
2. prepare a design of two or more colors;	Describe, demonstrate, and have the students use the procedures for preparing a design of two or more colors and for separating colors into separation drawings.	Graphic Arts, McKnight Publishing Company, Chapter 5
3. prepare separate stencils for multicolor screen-printing of designs;	Discuss, demonstrate, and have the students prepare the requisite stencils.	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
4. print copies of stencils for multicolor designs.	Discuss overprinting, outlining, sequence of printing, controls for separation, and controls for printing. Demonstrate the preparation, maintenance, safety precautions, and clean-up procedures of screen-printing equipment during the printing of copies of multicolor designs. Have the students adhere and print copies of stencils for multicolor designs.	
F. VACUUM SCREEN-PRINTING		
The student should be able to:		
1. demonstrate the understanding of the concept of vacuum screen-printing;	Explain the purpose and concept of vacuum screen-printing as a graphic arts process and a means of communicating graphically.	Vacuum screen-printer
2. operate a vacuum screen-printer.	Demonstrate and have the students operate a vacuum screen-printer.	

IX. RELIEF PRINTING (C.)

Estimated Time: 10 hours

MAJOR OBJECTIVE: To explore the development and purpose of relief printing; to gain knowledge and skills, and to participate in experiences related to the graphic arts processes of relief printing.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
A. INTRODUCTION TO RELIEF PRINTING The student should be able to:		
1. define relief printing;	Show the students examples of relief printing. Have the students discuss and prepare a definition of relief printing to be included in the vocabulary section of their notebooks. Make the students aware that relief printing is often referred to as letterpress printing. Explain the terms backwards or wrong reading and right reading as they apply to the preparation of letterpress plates.	RELIEF PRINTING: The process of printing from a raised surface
2. outline the history of relief printing;	Discuss and have the students research and prepare an illustrated report about the development of relief printing from its origin to the present.	
3. explain the principle of relief printing.	Describe the principle of image transfer from a raised printing surface through the preparation and use of linoleum blocks.	Graphic Arts Fundamentals, The Goodheart-Willcox Company, Inc., pp. 83-86

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
B. MAGNETIC SIGN PRESS		
The student should be able to:		
1. describe the function of a magnetic sign press;	Explain that large relief type or images are held by magnets on a proof press to print a limited number of signs.	
2. lay out type for a magnetic sign press;	Acquaint the students with the following equipment and supplies: sign press, type, ink brayer, ink board, paper, and various clean-up supplies. Demonstrate and have the students use the procedures to lay out type for a magnetic sign press. Arrange a visit to a commercial printing business which uses magnetic press printing and have the students prepare a report about the visit.	
3. operate a magnetic sign press.	Explain and demonstrate the operation, trouble shooting, and clean-up procedures, and have the students print copies of previously set type.	
C. RUBBER STAMP		
The student should be able to:		
1. explain the function of a rubber stamp;	Show the students examples of reproduction prepared by means of a rubber stamp. Point out that a rubber stamp, a relief-printed image, provides fast,	Graphic Arts, McKnight Publishing Company, pp. 46-49

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	efficient, portable, and good quality reproduction of small amounts of information required repeatedly.	
2. identify the equipment and materials for manufacturing a rubber stamp;	Explain the purposes of the following equipment and materials for manufacturing a rubber stamp: rubber stamp press, type, chase, matrix board, rubber, mold-release powder, and handles.	The Basic Book of Graphic Arts, American Technical Society, Chapter 2, Unit 13
3. set the type for the matrix mold;	Demonstrate and have the students use the proper procedures for setting type.	Introduction to Graphic Arts, American Technical Society, pp. 196-198
4. produce and secure a rubber stamp to a wood mount.	Explain and demonstrate the production of a rubber stamp by emphasizing the steps involved in each of the following procedures: - setting and locking the type in a chase; - making the matrix; - vulcanizing the rubber form; - securing the rubber stamp to a wood mount. Have the students prepare their own rubber stamps, following safety precautions.	Understanding Graphic Arts, South-Western Publishing Company, pp. 141-142 Graphic Arts, 5th ed., Chas. A. Bennett Co., Inc., pp. 48-50

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
D. PLATEN PRESS		
The student should be able to:		
1. describe the function of a platen press;	Have the students prepare a bulletin board display of examples of various kinds of platen press printing. Make the students aware that the platen press uses a relief printing process for short and long print runs.	Graphic Arts, 5th ed., Chas. A. Bennett Co., Inc., Chapter 3
2. identify type styles and sizes and spacing materials;	Discuss and have the students use discarded print materials from which to prepare charts, bulletin board displays, and illustrated reports on the following typefaces: old style, modern, square serif, sans serif, occasional and novelty, cursive or script, and text or Old English. Show the students examples and discuss the function of spacing materials: quads, spaces, leads, and slugs.	Graphic Arts Fundamentals, The Goodheart-Willcox Company, Inc., Unit 5 Understanding Graphic Arts, South-Western Publishing Company, Part II, Units 7 and 8
3. prepare a layout for a platen press;	Review the point system of measurement and the use of line gauges in printing. Have the students prepare a layout on paper and identify the type styles and sizes to be used.	
4. set type for a platen press;	Explain and demonstrate the proper procedures for using a California job case, composing stick, furniture, and	The Basic Book of Graphic Arts, American Technical Society, Chapter 2, Units 7-12

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	quoins. Have the students use these procedures and related materials to compose and lock up type.	Graphic Arts, McKnight Publishing Company, Chapter 3
5. produce an acceptable print using a platen press.	Describe and show the students the processes of inking, making ready, and image transfer. Have the students print letterheads, envelopes, telephone message pads, or other useful items. Demonstrate and have the students follow the steps for type and press clean-up and type distribution. Emphasize safety precautions and procedures.	

X. BLACK AND WHITE PHOTOGRAPHY (C.)

Estimated Time: 10 hours

MAJOR OBJECTIVE: To recognize the function and principles of black and white photography; to acquire knowledge; and to explore skills, techniques, and applications of black and white photography in graphic arts processes.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
A. INTRODUCTION TO PHOTOGRAPHY The student should be able to:		
1. explain the function of black and white photography;	Discuss and use examples to point out that photographs contribute to graphic communications by adding clarity and interest to visual messages. Have the students build bulletin board displays or prepare illustrated reports about the various ways photographs are used to convey messages.	Introduction to Graphic Arts, American Technical Society, Section 5, Unit 15
2. describe the process of making black and white photographs;	Outline the following steps in the process of making photographs: exposing the film in a camera, processing the film to make a negative, and converting the negative into a positive print by contact or projection printing.	Photography, McKnight Publishing Company, Chapter 1
	Point out that the process of photography involves recording light on film.	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
3. identify the principles of photography.	Discuss and have the students describe each of the following principles of photography: light, optics, silver compounds, and mechanics. Emphasize the following: a) A camera takes pictures of light reflecting from objects. b) Optics is the technical field dealing with lenses and their functions. c) Light creates a picture inside a camera by striking a light-sensitive silver compound. d) The main mechanics of cameras consist of light-tight boxes, lenses, and devices for controlling exposure.	What is Photography? (transparencies), Administration Information Media Educational Aids Basic Photography, Parts I and II (kit), Library, Manitoba Department of Education
B. LIGHT AND MATERIALS	Emphasize the importance of light and light reflection to photography. Discuss the following concepts: a) A photograph is a picture made by light. b) The object being photographed reflects light. c) When a camera's lens shutter is opened, a small amount of light, reflected from the object being photographed, enters the camera, strikes the film, and produces a negative image.	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	d) Reflected light comes from several sources, which affects the operation of the camera and the materials used in the camera.	
The student should be able to:		
1. describe the principle of light reflection;	Discuss and have the students give examples of light sources. Relate the various light sources to the principles of photography.	LIGHT SOURCES 1. Natural light--daylight, fire 2. Artificial light--electricity, electronics 3. Chemical light--phosphorescent, fluorescent
2. explain the composition of light sensitive materials;	Show the students examples of light sensitive materials, and describe their composition and how they record images. Explain that a simple sun picture is a picture made with a sheet of studio proof paper, the object(s) to be photographed, and direct sunlight or another source of strong light. Have the students experiment with the preparation of sun pictures and discuss their disadvantages and methods for storing.	SUN PICTURES: Shadow prints of objects placed on studio proof paper The Basic Book of Photography, American Technical Society, Unit 2
3. produce a photogram.	Define and show students examples of photograms. Have the students produce photograms containing tonal gradations by using different materials such as leaves, keys, prisms, crushed cellophane. Outline and have the students use, in correct order, the chemical steps required in processing black and white photographic	PHOTOGRAM: A shadow image made by laying objects on top of photographic paper and exposing it through the objects

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	paper. Point out the need to observe and use time and temperature requirements. Explain the preparation and the use of chemicals and the need for observing safety precautions and procedures. Emphasize the necessity of reading directions for the safe use of chemicals.	
C. CAMERAS		
The student should be able to:		
1. identify the basic types of cameras for graphic reproduction;	Discuss and show the students illustrations and/or examples of a pinhole box, and folding, reflex, miniature, and press cameras. Have the students describe and compare the cameras as they relate to the four principles of photography.	The Basic Book of Photography, American Technical Society, Units 6, 7, 8, 9, 11 Photography, McKnight Publishing Company, Chapters 3, 5
2. describe the major parts of cameras;	Show and have the students describe these major parts of cameras: light-excluding enclosure, film holder, lens, shutter, and aperture. Explain how these parts aid in controlling the light that reaches the film.	Introduction to Graphic Arts, American Technical Society, Section 5, Unit 15
3. build and use a pinhole camera;	Demonstrate and ask the students to follow the procedures for building and using a pinhole camera.	The Basic Book of Photography, American Technical Society, Units 3, 4

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
4. use a light meter to determine the exposure setting for a film;	Demonstrate and have the students follow the procedures for using a light meter to set the correct exposure on a camera for a particular film.	The Camera, Exposure Controls, Light and Lenses, Lighting, Composition (transparencies, Photography Series), Administration Information Media Educational Aids
5. operate a camera.	Explain and demonstrate general procedures for operating a camera: selection of film, loading the camera, focusing the camera, controlling light intensity and exposure time, determining correct exposure. Have the students follow these procedures and encourage them to study the camera instruction manual for specific handling instructions. Have the students work in groups to use a camera to take a roll of film based on a particular theme, incorporating the elements and the principles of design. Provide the students with opportunities to use various lenses, light-sensitive materials, light sources, and filters.	Basic Photography (kit), Library, Manitoba Department of Education Camera instruction manual
D. FILM PROCESSING AND PROJECTION PRINTING The student should be able to:		
1. describe the principle of film processing;	Discuss and explain that an exposed film contains a latent image which must be processed to become visible.	Black and White Photography (transparencies), Administration Information Media Educational Aids

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Point out that this process is called developing and that the chemical used in the process is called the developer.	
2. develop a photographic film;	Identify and explain the purpose of the chemicals required to develop film. Emphasize that developing film involves a series of chemical reactions. Demonstrate and have the students practice the correct sequence of procedures for processing a roll of exposed film. Point out that developing a film depends on two necessary factors: time and temperature. Emphasize and have the students follow safety precautions and procedures.	DEVELOPING CHEMICALS 1. Developer 2. Stop bath 3. Fixer Photography, McKnight Publishing Company, Chapter 6 The Basic Book of Photography, American Technical Society, Unit 10 Filters (Black and White Photography), Film, Print Making (transparencies, Photography Series), Administration Information Media Educational Aids
3. use the contact printing method to process negatives into positive prints;	Explain that photographic printing is the process of making positive images from negatives. Point out that contact printing is the process of photographic printing in which the negative is placed in direct contact with the paper to develop a finished contact print the same size as the original negative. Demonstrate and have the students use the correct procedures to make contact prints of their negatives.	The Basic Book of Photography, American Technical Society, Unit 5 Basic Black and White Printing, Advanced Black and White Printing, Processing Black and White Film, Basic Photo Composition, Film: How It Works (slides/tapes), Canadian Kodak Company, Limited

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
4. use an enlarger for print production.	Point out that enlarging, or projection printing, is the process of making large prints from small negatives, and is a skilled and creative photographic process. Have the students identify the major parts of an enlarger. Demonstrate and have the students use the procedures to complete the steps for enlarging: exposing and developing enlarging paper. Discuss and demonstrate the steps required to make a test strip. Provide the students with opportunities to practice setting the enlarger adjustments for picture size, focus, and lens opening. Encourage the students to assess the quality of enlargements and to make recommendations for improvements.	The Basic Book of Photography, American Technical Society, Unit 12

XI. PROCESS PHOTOGRAPHY (C.)

Estimated Time: 6 hours

MAJOR OBJECTIVE: To gain knowledge about the significance of process photography; to acquire skills and techniques to apply process photography to graphic arts procedures.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
A. INTRODUCTION TO PROCESS PHOTOGRAPHY The student should be able to:		
1. describe the principle of process photography;	Define process photography. Explain that the main purpose of process photography is to convert line and continuous-tone copy into the film negatives and positives required to prepare printing plates. Explain the terms line copy and halftone copy. Point out that process photography is a type of photo conversion during which camera-ready art is photographed onto light-sensitive film and the film is developed. Show the students examples of paste-ups with line drawings and text ready for photography and photographs of the same paste-ups. Discuss and/or have the students identify the design elements and principles incorporated into the paste-ups.	PROCESS PHOTOGRAPHY: Photographing line and continuous (halftone) copy to produce high contrast line and halftone negatives OR A means of producing line or halftone negatives and positives LINE COPY: Copy containing only blacks and whites and in which there are no gray tones HALFTONE COPY: Photographs and other artwork that contain a complete range of tones from black to white OR A reproduction of continuous-tone copy formed by printed dots of various sizes

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
2. identify the equipment and materials for process photography;	Have the students collect information and prepare displays and illustrated reports on the equipment and materials for process photography. Discuss.	
3. recognize line reproduction and halftone images.	Review the definitions for line reproduction and halftone images. Show and have the students identify the two types of images.	
B. CAMERAS AND MATERIALS The student should be able to:		
1. identify the types of process cameras;	Acquaint the students with various types of cameras by using discussion supported by textbook readings and illustrations; brochures from manufacturers and suppliers; visits to graphic industries; guest speakers to talk about the cameras; slides, transparencies and filmstrips; and/or demonstrations of classroom equipment. Point out that the type of installation will determine the type of camera used.	PROCESS CAMERAS 1. Horizontal 2. Vertical PROCESS CAMERA: A camera that produces film for use in making plates, screens, or other image carriers in printing CAMERA INSTALLATION 1. Gallery 2. Dark room
2. explain the various methods of producing negatives, positives, and halftones;	Discuss the methods of using process photography to produce negatives, positives, and halftones.	High Contrast Photography (transparencies), Administration Information Media Educational Aids

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
3. describe the materials requisite to process photography.	Demonstrate and have the students prepare displays or write reports about the materials necessary for process photography.	MATERIALS FOR PROCESS PHOTOGRAPHY 1. Films 2. Photo-mechanical transfers 3. Contact screens
C. PROCESS CAMERA OPERATION The student should be able to:		
1. identify the major parts of a process camera;	Discuss the major parts of a process camera. Have the students prepare a simple diagram or use a prepared diagram to illustrate and label the copyboard lights, lens, bellows, and film holder.	The Process Lens, Line Photography--Basic Procedures (sound-filmstrips), McKnight Publishing Company
2. compute proportional size reproduction by the percentage method;	Explain the concept of percentage reproduction and its application in copy preparation. Make the students aware of the relationship between f/stop openings and exposure times as they apply to the process of enlarging or reducing copy. Discuss, demonstrate, and have the students show the size relationship among f/stop openings by drawing a series of circles of varying sizes, and including illustrations to represent f/stops of 8, 11, 22, 32, and 45. Demonstrate and have the students practice using an exposure compensation	PERCENTAGE REPRODUCTION 100% - Full size 100%(+) - Larger than original 100%(-) - Smaller than original F/STOPS: The fixed openings in a camera's lens through which light passes. The size of each f/stop is indicated by an f number EXPOSURE: The time during which a light-sensitive surface is struck by light while in a camera or printing frame

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	table to compute exposure times required to reduce and enlarge copy by certain percentages. Have the students prepare charts, posters, or bulletin board displays of reductions and enlargements with examples of layouts requiring reductions and enlargements.	Shedding Light on Light (kit), Library, Manitoba Department of Education Exposure compensation table
3. operate a process camera;	Review the parts of a process camera. Explain, demonstrate, and have the students operate a process camera. Describe the function of size controls, film carriers, copy carrier, and exposure controls.	Introduction to Graphic Arts, American Technical Society, Section 7, Unit 19
	Identify and explain the characteristics of the types of process films. Have the students make line shots suitable for printing on available equipment. If no process camera is available, have the students use an enlarger body modified to copy or an ordinary camera.	The Basic Book of Graphic Arts, American Technical Society, pp. 78-81
	Discuss and demonstrate the procedures for preparing halftone reproductions. Review the types and characteristics of films, and the types and uses of screens for preparing halftone reproductions. Have the students prepare a simple diagram illustrating how different amounts of light pass through a contact screen, and how this affects the size and shape of dots formed on a	TYPES OF SCREENS 1. Magenta 2. Elliptical dot 3. Autoscreen film Understanding Graphic Arts, South-Western Publishing Company, Part II, Unit 5

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	halftone negative. Explain the following processes related to the preparation of halftone reproductions: exposure, flashing, highlight areas, and shadow areas. Have the students use an autoscreen film in a 35 mm camera and expose, flash, develop, and enlarge into a positive for screen printing. Provide the students with opportunities to prepare, assess, and compare various types of process photography: line negatives and positives, halftones, photo-mechanical transfer, enlargements, and reductions.	Fundamentals of Process Photography, Halftone Photography: Theory and Basic Procedures, Making a One-Colour Halftone Negative (sound-filmstrip), McKnight Publishing Company

XII. PLANOGRAPHIC PRINTING (C.)

Estimated Time: 10 hours

MAJOR OBJECTIVE: To recognize the development, significance, and principles of planographic printing; to gain knowledge about and to explore and apply the skills pertinent to plate preparation, press operation and maintenance for the lithographic processes.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
A. INTRODUCTION TO PLANOGRAPHIC PRINTING The student should be able to:		
1. define planographic printing;	Discuss and have the students prepare a definition of planographic printing. Point out that image and non-image areas are on the same plane or level and indicate that lithography and offset printing are synonymous terms.	PLANOGRAPHIC PRINTING: Printing from flat surface
2. outline the history of planographic printing;	Explore with students or have them research and prepare an illustrated report about the development of planographic printing from its origin to the present.	Understanding Graphic Arts, South-Western Publishing Company, pp. 22-23
3. collect information about the use of planographic printing in industry.	Encourage the students to collect examples and prepare posters, bulletin board displays, collages, or illustrated reports about the ways in which industry uses planographic printing.	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
B. PRINCIPLES OF PLANOGRAPHIC PRINTING The student should be able to:		
1. explain the principle of planographic printing;	Review the definition of planographic printing. Point out that the printing surface used in planographic/lithographic printing is flat, and the printing of images takes place because of the principle that grease and water do not mix	Graphic Arts, McKnight Publishing Company, Chapter 16 The Basic Book of Graphic Arts, American Technical Society, Units 16, 17, 18 Introduction to Graphic Arts, American Technical Society, Section 2, Unit 5 Graphic Arts, 5th ed., Chas. A. Bennett Co., Inc., Chapter 8
2. describe the principles of offset printing.	Explain that offset printing is a type of planographic printing. Discuss and show the students the basic principles related to offset printing: - reaction between grease and water; - ink and water systems; - reading images; - sheet-fed and web-fed systems.	The Offset Press Operation (color filmstrips, cassettes, program guide, reproducible masters), Prentice-Hall Media Introduction to Printing Process, Basic Fundamentals of Photo-Offset Lithography (sound-filmstrips), McKnight Publishing Company

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
C. PLATE PREPARATION The student should be able to:		
1. define platemaking;	Discuss and have the students prepare a definition of platemaking for inclusion in their notebooks.	PLATEMAKING: The process of exposing and developing an image on the image carrier
2. identify the various types of lithographic plates;	Show the students examples of lithographic plates and acquaint them with the two main parts of lithographic plates: a) the image area, which is the grease-receptive and water-repellent area; b) the non-image area, which is the water-receptive and grease-repellent area.	Introduction to Graphic Arts, American Technical Society, Section 8, Unit 24 Graphic Arts, McKnight Publishing Company, Chapter 4
	Discuss and show the students examples of plates: direct-image plates, diffusion-transfer plates, pre-sensitized plates. Emphasize the following: a) Direct-image plates are made from paper and plastic. b) Diffusion-transfer plates are made from mechanicals or paste-ups which are exact duplicates of the job to be printed. c) Pre-sensitized plates are made by contact printing through film negatives of mechanicals.	TYPES OF LITHOGRAPHIC PLATES 1. Direct-image 2. Diffusion-transfer 3. Pre-sensitized/photo direct 4. Electrostatic

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	d) Electrostatic plates are made by copiers or electrostatic platemakers, which expose the plates automatically and deliver them ready for use.	
3. prepare plates.	Demonstrate the procedures for plate preparation. Have the students produce plates for production of graphic messages by the lithographic process. Emphasize safety precautions and procedures. Have the students review and use design elements and principles during the preparation of plates.	
D. PRESS OPERATION The student should be able to:		
1. describe the four basic systems of offset presses;	Discuss and explain the functions of the basic systems applicable to all offset presses: feeder, registration, printing, and deliverer. Have the students prepare a poster that illustrates how the systems of the offset press work.	
2. identify the parts of each of the basic systems;	Acquaint the students with the parts and functions of each of the basic systems. Have the students label each of the parts on illustrations of the various systems. Emphasize the function and relationship of the following	Paper and Papercutting Calculations, Lithographic Offset Press Fundamentals, Lithographic Offset Press Cylinder Packing, Offset Press Makeready (sound-filmstrips), McKnight Publishing Company

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	steps and units of the printing system: inking, dampening, plate, blanket, impression. Have the students research information pertinent to the acquamatic unit.	
3. operate the press.	Have the students study the press instruction manuals. Demonstrate and have the students use the following procedures to run copies of plates on the press: a) Prepare the press for operation through visual inspection, turning by hand, lubricating, turning on the press, and checking job specifications. b) Set up for operation by preparing the ink unit and water unit; installing the plate; performing pressure checks; preparing the feeder, sheet controls, and delivery; setting up the feeder; preparing the conveyor board and sheet controls; setting up the delivery unit; inspecting the test sheets; making necessary adjustments; obtaining ink and water balance; and correcting image position on the sheet. c) Operate the press. d) Clean the press. e) Store the plates.	Press instruction manual Introduction to Graphic Arts, American Technical Society, Section 9, Unit 29

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Emphasize safety precautions and procedures throughout all the steps in press operation. Give the students checklists of steps in the operation of the equipment. Provide the students with opportunities to use the press for various types of printing projects. Arrange visits to printing plants and have the students prepare illustrated reports about the visits.	

XIII. INTAGLIO PRINTING (C.)

Estimated Time: 3 hours

MAJOR OBJECTIVE: To acquire knowledge of the development, importance and principles of intaglio printing; to acquire knowledge and explore the skills related to plate preparation for the intaglio printing process.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
A. INTRODUCTION TO INTAGLIO PRINTING The student should be able to:		
1. define intaglio printing;	Discuss and have the students prepare a definition of intaglio printing. Point out that intaglio (pronounced in-tal-yo) is another name for gravure printing. Indicate that intaglio printing is the reverse of relief printing.	INTAGLIO PRINTING: The printing process where the image area is below the non-image area and paper pressed against the image carrier picks up the ink in the image area
2. outline the history of intaglio printing;	Explore with students or have the students research information to prepare an illustrated report about the development of intaglio printing from its origin to the present.	Understanding Graphic Arts, South-Western Publishing Company, pp. 122-123
3. collect information about the use of intaglio printing in industry.	Encourage the students to collect examples and to prepare posters, bulletin board displays, or illustrated reports about the ways in which industry uses intaglio printing.	USES OF INTAGLIO PRINTING 1. Magazines 2. Mail order catalogues 3. Some stamps 4. Paper money 5. Prints 6. Some printed fabrics 7. Greeting cards 8. Packaging materials

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
B. PRINCIPLES OF INTAGLIO PRINTING The student should be able to:		
1. explain the principle of intaglio printing;	Review the definition of intaglio printing. Point out that during printing, ink is applied to the entire surface of the printing plate and then most of the ink is removed by scraping or wiping. Indicate that the only ink remaining is in the recessed image area.	Graphic Arts, McKnight Publishing Company, Chapter 3 The Basic Book of Graphic Arts, American Technical Society, Units 7-12
2. describe the operation of a basic rotogravure printing press.	Explain that "rotogravure" applies to gravure presses that use rounded plate cylinders rather than flat plates. Provide the students with a diagram showing how ink is transferred from image cavities in the printing plate to paper. Have the students label the following parts: ink fountain, doctor blade, plate cylinder, and impression cylinder. Emphasize that rotogravure presses are fast-operating presses which are capable of producing large quantities of color-printed images of high quality. Arrange a field trip to a commercial printing business which uses rotogravure presses and have the students prepare illustrated reports about the visit.	Understanding Graphic Arts, South-Western Publishing Company, Part II, Units 7, 8 Introduction to Graphic Arts, American Technical Society, Section 8, Unit 22; Section 9, Unit 27

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
C. GRAVURE PLATES The student should be able to:		
1. identify types of gravure plates;	Review the definition of platemaking. Show the students examples of the different types of gravure plates.	TYPES OF GRAVURE PLATES 1. Drypoint engravings 2. Etchings 3. Engravings
2. explain the procedures for preparing the various types of gravure plates;	Discuss the procedures for preparing each type of gravure plate. Acquaint the students with the tools and materials. Emphasize safety precautions for each of the processes.	Graphic Arts, 5th ed., Chas. A. Bennett Co., Inc., Chapter 9
3. prepare a drypoint engraving;	Demonstrate the use of tools and materials and have the students follow the procedures in their proper sequence for preparing a drypoint engraving. Emphasize the techniques and safety precautions. Encourage the students to apply design elements and principles.	
4. print from a drypoint engraving.	Demonstrate and have the students run copies from the drypoint engraving on a proof press and/or a sign press. ENRICHMENT PROJECT: Demonstrate and have the students prepare and run plates prepared by engraving and etching. Emphasize that engraving is different from drypoint engraving and	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	etching and that the lines of varying widths and depths for engraving are cut into metal. Point out that etching is a chemical process requiring the action of acid on metal. Ask the students to integrate design elements and principles and to use the requisite safety precautions for engraving and etching.	

XIV. PACKAGING AND PRESENTATION (C.)

Estimated Time: 3 hours

MAJOR OBJECTIVE: To recognize the significance of, to gain knowledge about, and to explore skills pertinent to finishing, binding, packaging, and distributing processes for graphic arts.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
A. COMMON FINISHING OPERATIONS The student should be able to:		
1. define finishing;	Discuss and have the students develop a definition for finishing.	FINISHING: The final step(s) consisting of several operations performed on printed material after it has left the press
2. identify the most common finishing operations;	Have the students list, define, and explain the purposes of the following most common finishing operations: cutting, folding, punching, drilling, gathering, collating, scoring. Point out that cutting is a pre-printing and post-printing operation.	PUNCHING: The process of cutting rectangular or specially shaped holes in paper for plastic and spiral binding DRILLING: The process of making holes in paper for insertion in ring binders GATHERING: The process of placing signatures or individual sheets in correct sequence COLLATING: The process of ensuring that the correct number of pages or signatures are gathered SCORING: The process of placing a crease in a sheet of thick paper or cardboard to aid in folding

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
3. operate a paper cutter;	Review and discuss the basic standard and metric sizes and weights of paper. Explain and have the students use the procedure for calculating paper cuts. Demonstrate and have the students prepare and use a paper-cutting chart. Emphasize the importance of planning and following the correct sequence to avoid waste of time and materials. Demonstrate and have the students follow the procedures for using the paper cutter for cutting paper prior to and after printing. Ask the students to make a poster on the safe and correct way to use a paper cutter and to follow the steps indicated on the poster.	Graphic Arts, Chas. A. Bennett Co., Inc., Chapter 5 Introduction to Graphic Arts, American Technical Society, Section 11, Unit 35 Understanding Graphic Arts, South-Western Publishing Company, Part III, Unit 14 The Basic Book of Graphic Arts, American Technical Society, Chapter 6, Unit 21
4. identify the different types of paper folds;	Point out that booklets, flyers, and programs require folding and that there are several types of folds. Show the students examples of these types of folds: single, parallel, accordian, panel, French, booklet.	
5. fold printed materials;	Demonstrate and have the students prepare, by hand or by machine, the different types of folds. Make the students aware of the relationship between designing and folding printed jobs.	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Emphasize that in preparing a design for printing, it is important to consider the different types of folds and the limitations of folding equipment.	
6. punch, drill, gather, collate, and score printed materials.	Demonstrate and provide the students with opportunities to punch, drill, gather, collate, and score printed materials as applicable to projects in graphic arts and graphic communications.	
B. AUXILIARY FINISHING OPERATIONS The student should be able to:		
1. identify the various types of auxiliary finishing operations;	Have the students locate examples of various types of auxiliary finishing operations and prepare bulletin board displays. Discuss and develop definitions for these auxiliary finishing operations to include in the vocabulary section of their notebooks: a) Die-cutting - the process of trimming paper stock to produce cuts so that stock can be folded into three-dimensional shapes. b) Corner rounding - the process of cutting radii on corners of paper. c) Embossing - a three-dimensional printing technique.	Graphic Arts, 5th ed., Chas. A. Bennett Co., Inc., Chapter 5 Cutting; Die Making and Die Cutting; Folding Operations; Gathering, Sewing, and First Forwarding Operations (color filmstrips, cassettes, guide, reproducible masters), Prentice-Hall Media

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	d) Foil stamping - the process of using metallic, gloss, or matte finish, or patterned stock, to impress a design onto paper. e) Glazing - the process of creating a smooth finish on heavy textured paper. f) Jogging - the process of evening up papers after they have been printed. g) Laminating - the process of applying a plastic film to printed material and/or sandwiching printed material between plastic film. h) Numbering - the process of numbering tickets, invoices, certificates, cheques, and similar printed work for security and control purposes. i) Perforating - the process of cutting rows of slots and dots across a sheet to make the paper easier to fold or tear. j) Scorching - an embossing process which produces a brown tint on the raised surface. k) Thermography - the printing technique for producing a raised printed surface. l) Marbelizing - the process of decorating the end papers of a book being bound.	

<table>
<tr><th>TOPICS AND OBJECTIVES</th><th>SUGGESTED ACTIVITIES AND NOTES</th><th>RESOURCES</th></tr>
<tr><td>2. explain the purpose of auxiliary finishing operations.</td><td>Show the students examples of completed graphic arts products. Explain that auxiliary operations are used to improve appearance and create effects that add an interesting quality to graphic arts and graphic communications products. Emphasize that auxiliary finishing operations refer to several operations that may be performed on printed materials after they have left the press.

Ask the students to prepare charts, such as the following, to summarize and compare the various auxiliary finishing processes:

<table>
<tr><th colspan="3">AUXILIARY FINISHING PROCESSES</th></tr>
<tr><th>Name</th><th>Description</th><th>Diagram of Process</th></tr>
<tr><td></td><td></td><td></td></tr>
</table></td><td></td></tr>
</table>

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
C. BINDING The student should be able to:		
1. define binding;	Discuss the process of assembling printed material into book form. Have the students prepare a definition for binding. Encourage the students to research and prepare an illustrated report on the history of book binding.	BINDING: Any method used to hold printed sheets of paper, folded or unfolded, together
2. identify common binding operations;	Have the students gather, compare, and prepare a display of examples of various binding operations. Point out that some bindings are designed for short life or low cost and others for long and hard usage. Indicate the relationship of the elements and principles of design to binding operations. Emphasize the need to include the binding operations in planning and designing products for graphic arts and communications. Discuss and develop definitions for these common binding operations, to be included in the vocabulary section of notebooks: a) Pamphlet or wire binding - the process used for binding brochures,	Graphic Arts, Chas. A. Bennett Co., Inc., Chapter 7 Introduction to Graphic Arts, American Technical Society, Section 11, Units 35, 36 Understanding Graphic Arts, South-Western Publishing Company, Part III, Unit 14 The Basic Book of Graphic Arts, American Technical Society, Chapter 6, Unit 22 Graphic Arts, McKnight Publishing Company, Chapter 6

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	booklets, and some magazines; consists of two methods: saddle-wire binding or saddle stitching, and side-wire binding or side stitching. b) Loose-leaf binding - the process of holding pages together by ring binders, binding posts, and binding post tongue cover; allows the pages to remain loose within the binders and new material to be added. c) Adhesive or perfect binding - the process of holding pages together with a flexible cement. d) Mechanical binding - the process of holding pages together by threading metal or plastic wire or strips through holes punched in paper. e) Case or conventional binding - the process of binding a book with a hard rigid cover.	Case Making, Casing In, and Perfect Binding; Mechanical Binding (color filmstrips, cassettes, program guide, reproducible masters), Prentice-Hall Media Finishing and Binding (transparencies), Administration Information Media Educational Aids
3. bind printed materials.	Prepare a bulletin board display on tools and materials for the various binding processes. Demonstrate and have the students use the step-by-step procedures for common binding operations. Emphasize safety precautions and techniques. Encourage the students to integrate binding processes into projects for graphic arts and graphic communications.	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
D. PACKAGING AND DISTRIBUTING The student should be able to:		
1. identify methods of packaging and distributing;	Discuss and have the students collect examples and research information related to the various methods of packaging and distributing completed graphic arts materials. Discuss the advantages and/or uses of each method.	
2. assess the advantages of the methods of packaging and distributing.	Explain the following processes, machines, and techniques: auto folding and inserting, address printer, automatic label applicator, plastic film bagging, shrink wrapping, bundling. Arrange visits to industries to view packaging and distributing processes and machines.	

XV. COLOR PHOTOGRAPHY (O.)

Estimated Time: 10 hours

MAJOR OBJECTIVE: To explore the significance of color photography; to acquire knowledge and to develop skills related to color photography, applicable to graphic arts processes.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
A. INTRODUCTION TO COLOR PHOTOGRAPHY		
The student should be able to.		
1. explain the importance of color photography;	Review camera operation and the films required for color still photography. Point out that color photography, a method of recording and processing images, is used by professionals and amateurs and is economical because of technological developments. Discuss the relationship of color photography to the design process for graphic arts and graphic communications.	The Basic Book of Photography, American Technical Society, Chapter 4, Unit 23
2. identify the formats of color still photography.	Discuss and show the students examples of the two formats: slides and prints. Indicate that slides are positives taken on color transparency film and that prints are usually made from color negative film.	Photography, McKnight Publishing Company, Chapter 14

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
B. COLOR SLIDES The student should be able to:		
1. explain the exposure and development processes for color slide films;	Discuss and acquaint the students with the techniques and processes for exposing and developing color slide films. Have the students take a roll of slide films based on several themes.	The Basic Book of Photography, American Technical Society, Chapter 4, Unit 22
2. process a color slide film;	Review the requisite safety precautions. Demonstrate and have the students use these basic steps in processing color slide films: - develop black and white image; - ionize undeveloped silver bromide crystals in reversal bath; - develop dyes of non-silver crystals for color development; - remove silver image and leave the dyes, through bleaching; - use fix for clearing remaining silver bromide and making the film transparent; - mount slides; - assess quality of slides by viewing.	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
C. COLOR PRINTS The student should be able to:		
1. explain and use the exposure process for a color film;	Review the exposure process for black and white photography. Identify films required for color prints. Have the students take color films based on various themes and using different light sources.	The Basic Book of Photography, American Technical Society, Chapter 4, Unit 23
2. describe the chemical processes for developing a color film;	Identify the equipment and materials necessary for developing color films. Explain the chemical processes and emphasize safety precautions. Have the students research and prepare an illustrated report on chemical processes.	Photography, McKnight Publishing Company, Chapter 14 One-Step Photographic Processes, Colour (transparencies, Photography Series), Administration Information Media Educational Aids
3. process a color print.	Demonstrate and have the students process color prints from negatives and/or slides. Encourage them to assess the quality of the color prints and make corrections to improve the quality.	

XVI. OFFICE GRAPHIC ARTS EQUIPMENT (O.)

Estimated Time: 2 hours

MAJOR OBJECTIVE: To acquire an understanding and an appreciation of the developments, processes, and skills related to office graphic arts equipment.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
A. INTRODUCTION TO OFFICE GRAPHIC ARTS The student should be able to:		
1. recognize the need for office printing;	Have the students prepare a bulletin board display of samples of various types of printed matter, duplicated/printed in a business office. Through lectures and visits to business offices, make the students aware that these offices handle large quantities of printed and illustrated material which must be reproduced/printed quickly and at low cost. Indicate that persons who operate these machines do not require highly developed skills in printing, and that the graphic arts office equipment is smaller and less complicated than graphic arts equipment used in industry.	Graphic Arts Fundamentals, The Goodheart-Willcox Company, Inc., Unit 18

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
2. outline the history of office printing equipment and processes;	Have the students prepare illustrated reports on the history of office printing equipment and processes for the following: carbon copies, spirit duplicating, mimeograph duplicating, small offset duplicators, photocopiers, electrostatic duplicating, and future developments.	Understanding Graphic Arts, South-Western Publishing Company, pp. 25-28
3. identify non-printing office graphic arts equipment;	Show the students illustrations or examples of non-printing equipment used in an office: paper cutters, collating and binding equipment, small paper folder.	Graphic Arts, 5th ed., Chas. A. Bennett Co., Inc., Chapter 14
4. explain the influence of automation and technology.	Point out that automation and other technological developments have brought about the replacement of several types of office copiers/printers, such as spirit and mimeograph duplicators.	
B. METHODS OF OFFICE PRINTING		
The student should be able to:		
1. identify modern office printing equipment;	With the students, discuss the types of modern office printing equipment. Make the students aware that most offices use some type of electrostatic	Graphic Arts Fundamentals, The Goodheart-Willcox Company, Inc., Unit 18

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	copier which produces duplicate copies directly from handwritten, typed, or printed originals. Indicate that specially prepared plates, masters, and stencils are not required for the electrostatic copying/printing process.	
2. describe the electrostatic printing process;	Discuss and explain the direct and transfer processes of electrostatically produced copies. Have the students research information in manufacturers' manuals and prepare reports on the electrostatic printing process.	Understanding Graphic Arts, South-Western Publishing Company, Part II Unit 11
3. operate an electrostatic copier;	Explain that although controls and procedures may differ slightly from model to model, the general operating procedures apply to each model. Emphasize the importance of consulting the instruction manual. Discuss and demonstrate these general operating procedures: a) Check and/or add to the paper supply. b) Check and/or replenish the toner in the toner supply tank. c) Turn on the power. d) Set the counter for the required number of copies. e) Feed the original into the machine or place it on the glass plate. The image side of the original must face the lens.	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	f) Remove original and copies. g) Turn off the machine. Have the students use the operating procedures to prepare copies of various types of materials. Arrange a visit to an office, a supplier, or an instant printing shop, to have the students view the operation of an electrostatic copier. Have the students prepare illustrated reports on the operating procedures of an electrostatic copier.	
4. explain the use of electrostatic copying machines linked to computers.	Through visits to industries, make the students aware of the link between electrostatic printers and computers. Have students research literature about the link. Explain these concepts: a) Original copies are not required when copying electrostatically via the computer. b) Layout is programmed into the computer. c) Layout may consist of type and/or illustrations. d) Several type fonts, which the programmer can use to mix and match typefaces, are available in the computer. e) Laser is used to scan the drum internally.	

XVII. ELECTRONIC SYSTEMS (O.)

Estimated Time: 2 hours

MAJOR OBJECTIVE: To acquire understanding and appreciation of the influence and functions of computers and computer-directed devices on graphic arts processes.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
A. INTRODUCTION TO ELECTRONIC SYSTEMS The student should be able to:		
1. demonstrate an awareness of the influence of computers on the graphic arts and communications processes;	Discuss the influence of computers and computer-directed devices on printing processes. Arrange field trips to businesses, industries, and trade shows to acquaint the students with the ways in which computers are used in various printing processes. Have the students research information from newspapers, periodicals, and advertising literature. Emphasize that, through computers, people have extended the ability of their brains to store and process information, but that computers and computer-directed devices are only capable of processing information according to given programs. Point out that through the combined use of brains, computers, and computer-directed devices, people can identify and work on increasingly complicated problems and projects related to graphic arts and communications processes.	Understanding Graphic Arts, South-Western Publishing Company, Part IV, Unit 14

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
2. recognize the relationship of the computer to the graphic arts industry.	Indicate that computer systems, computers, and computer devices are used in preprinting processes, printing, and postprinting processes for preparing, storing, using, and delivering information electronically. Discuss and have the students research the influence of computer-based automation on printing presses, speed and quality of printing, and future careers. Relate these developments to the information explosion, and to the increasing need to store, prepare, and communicate information quickly and accurately. Make the students aware that increased automation of printing is one way of controlling prices so that people can afford to buy printed products. Discuss the relationship to consumerism.	Graphic Reproduction, Chas. A. Bennett Co., Inc., pp. 115-142, 221-222
B. COMPUTER AND COMPUTER-RELATED APPLICATIONS The student should be able to:		
1. identify new technological preprinting processes;	Discuss, demonstrate , and have individual or groups of students present illustrated talks or written reports on the following developments: - electronic typesetting and page composition;	Graphic Arts Fundamentals, The Goodheart-Willcox Company, Inc., pp. 95-97

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	- electronic cameras; - electronic color separation; - electronic proofing; - laser platemaking; - electronic scanner; - satellite transmission; - audio-recognition/voice-activated systems. Have the students use or view some of the following devices: microcomputers used as a word processing system or part of a system to typeset information; electronic scanner for process photography; layout through the use of a computer terminal. Discuss the relationship to planning and the elements and principles of design.	
2. describe recent innovations related to printing processes;	Explain or have the students view and use the following recent innovations related to preparation and operation of printing equipment: ink for electronic printers, data recording controls, ink jet printing, and electronic-electrostatic copying and printing.	Understanding Graphic Arts, South-Western Publishing Company, Part IV, Unit 15
3. explain post-printing electronic applications.	Discuss and have the students view or collect information about the following electronically operated and controlled post-printing processes:	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	- electronic beam (EB) ink curing; - electronically controlled folding, cutting, counting/collating, binding, and packaging processes. Point out the relationship to finishing and binding processes and techniques.	

graphic communications

CORE MODULES: Student Orientation, Safety, Careers, Measurement, Planning and Design, Consumerism, Sketching, Mechanics of Drawing, Pictorial Drawing, Orthographic Drawing, Drawing, Interpretation, Design Concepts, Screen-Process Printing, Relief Printing, Black and White Photography, Process Photography, Planographic Printing, Intaglio Printing, Packaging and Presentation

OPTION MODULES: Color Photography, Office Graphic Arts Equipment, Electronic Systems

GRAPHIC COMMUNICATIONS

I. STUDENT ORIENTATION (C.)

Estimated Time: 3 hours

MAJOR OBJECTIVE: To explore the significance of industrial arts and to relate it to the needs of individuals, industry, and society.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	NOTE: Refer to Common Modules for Module I, Student Orientation.	Industrial Arts 7-9: Graphic Communications (Drafting, Graphic Arts, Graphic Communications), Module I, Student Orientation

II. SAFETY (C.)

Estimated Time: 4 hours

MAJOR OBJECTIVE: To develop a high degree of safety consciousness, practice and application in the use of tools, equipment, and processes, through a wide range of exploratory experiences as they relate to individuals and to production and servicing aspects of hobbies and industries.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	NOTE: Refer to Common Modules for Module II, Safety. Emphasize the following: a) Students learning the basics of graphic communications must learn safety precautions. b) The right way of doing a job is the safe way. c) The use of safety precautions is protection against injury. d) Safety is a matter of good common sense and good judgment. e) Applying safety precautions in all shop activities is essential to making them a part of regular work habits.	Industrial Arts 7-9: Graphic Communications (Drafting, Graphic Arts, Graphic Communications), Module II, Safety

III. CAREERS (C.)

Estimated Time: 3 hours

MAJOR OBJECTIVE: To gain information about the general occupational characteristics of a variety of career fields and to match interests, abilities, preferences, and values to characteristics of various careers.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	NOTE: Refer to Common Modules for Module III, Careers. Point out that graphic communications is a rapidly changing industry; that change brings opportunities to people and businesses who are prepared for new developments; that new technologies result in new career opportunities which will require additional education and/or training.	Industrial Arts 7-9: Graphic Communications (Drafting, Graphic Arts, Graphic Communications), Module III, Careers. Graphic Communications, McKnight Publishing Company, Chapter 15

IV. MEASUREMENT (C.)

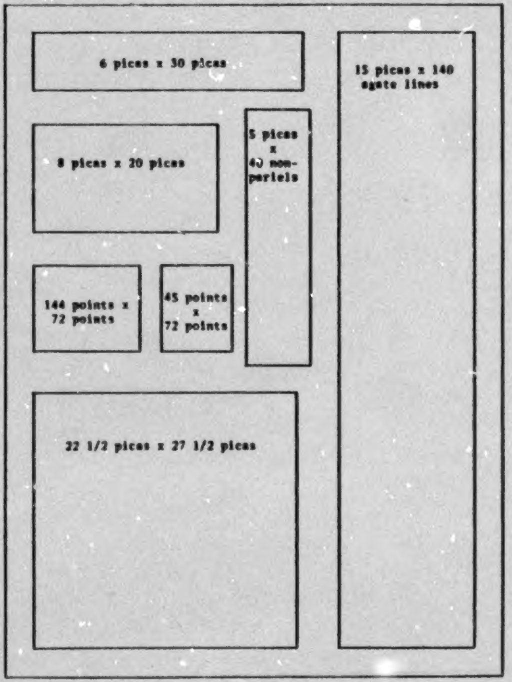
Estimated Time: 4 hours

MAJOR OBJECTIVE: To gain knowledge and skills related to imperial and SI metric systems of measurement, and to the point system, line gauges, and drafting scales pertinent to the various products of graphic communications.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Integrate and emphasize instruction, practice, and applications of measurement throughout the graphic communications area of study. Make the students aware that accurate measurements are necessary in planning and designing graphic messages.	
A. INTRODUCTION TO MEASUREMENT The student should be able to:		
1. define measurement;	Discuss and have the students prepare a definition of measurement. Emphasize that measurement is a method used to communicate information about size, shape, distance, and weight. Explain that measurement is made by comparing an unknown quantity with a standard or known quantity. Have the students research and prepare an illustrated report on how the system of measurement developed from ancient times to the present.	MEASUREMENT: A method of communicating size, shape, distance, and weight The World Book, World Book-Childcraft International, Vol 13, pp. 280-284

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
2. explain the importance of and the need for measurement;	Discuss the relationship between good workmanship and accurate measurements. Have the students identify ways in which measurement applies to graphic communications. Point out the application of measurement to job planning and layout for the various products of graphic communications.	Drawing and Planning for Industrial Arts, Chas. A. Bennett Co., Inc., Units 2, 31 The Basic Book of Drafting, American Technical Society, Unit 7
3. recognize the need for standards.	Point out that standards for graphic communications have developed over the years and have been agreed upon by people and organizations, such as ISO, with representation from many industries. Discuss the need for standards for sizes and weights of various kinds of paper products as well as standards related to measuring type and preparing layouts. Discuss the relationship of measurements in drafting to graphic communications.	ISO: International Organization for Standardization
B. MEASUREMENTS FOR GRAPHIC COMMUNICATIONS The student should be able to:		
1. identify the measurement systems for graphic communications;	Explain that the imperial and metric measurement systems pertain principally to the size and weight of paper products used in the graphic communications industry, and are expressed in inches and pounds and millimetres and	MEASUREMENT SYSTEMS FOR GRAPHIC COMMUNICATIONS 1. Imperial system 2. Metric system 3. Point system

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	grams, respectively. Have the students research the conversion to the metric system in the graphic communications industry and the use of metric measurements for many years in the photography area of graphic communications. Discuss systems of measurement used in drafting which are applicable to graphic communications. Make the students aware that problems inherent to the linear system led to the development of the point system. Have the students prepare an illustrated report on the development of the point system.	Graphic Arts, McKnight Publishing Company, Chapter 3 The Basic Book of Drafting, American Technical Society, Unit 9 The Basic Book of Graphic Arts, American Technical Society, Unit 4
2. explain the point system;	Discuss the printers' point system. Indicate that knowledge of the system is important in understanding, handling, and planning paste-ups for the various types of graphic communications. Emphasize that this system is the accepted standard way of communicating dimensions in the graphics industry. Students should learn it as one of the preliminary steps to any work in graphic communications. List and describe the relationship among the units of measurement in the printers' point system. Point out that an agate line is a standard measurement dor depth of columns of advertising space. Have the students outline a paper area of 9" x 12", and an image area of 8" x 10" on a piece of illustration board	POINT SYSTEM: Printers' system of measurement based on the point POINT SYSTEM OF MEASUREMENT 1 point = 1/72 inch 1 inch = 72 points 12 points = 1 pica 6 picas = 1 inch 6 points (1/2 pica) = 1 nonpareil 5 1/2 points = 1 agate

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	and use a line gauge to trim paper to the following exact dimensions: 6 picas x 30 picas, 8 picas x 20 picas, 144 points x 72 points, 48 points x 72 points, 5 picas x 40 nonpareils, 22 1/2 picas x 27 1/2 picas, and 15 picas x 140 agate lines. Ask the students to paste these papers in the positions shown and label them as indicated in the illustration.  6 picas x 30 picas 15 picas x 140 agate lines 8 picas x 20 picas 5 picas x 40 non-pareils 144 points x 72 points 48 points x 72 points 22 1/2 picas x 27 1/2 picas	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
3. use line gauges and drafting scales.	Describe and demonstrate the correct use of the line gauge. Identify and explain the two scales in the line gauge: inch scale and pica scale. Indicate that with the development of the SI metric system, the line gauge may have millimetre graduations along one side. Have the students use the line gauge to measure type and prepare layouts for various kinds of graphic communications. Identify, explain, and demonstrate the scales used in technical drawing. Provide opportunities for the students to use drafting scales in layouts for graphic communications projects.	Graphic Communications, McKnight Publishing Company, Unit 2 Graphic Arts, McKnight Publishing Company, Chapter 3 The Basic Book of Graphic Arts, American Technical Society, Unit 4 The Basic Book of Drafting, American Technical Society, Units 7, 8 Drafting: Metric, American Technical Society, Units 1, 11 TYPES OF DRAFTING SCALES 1. Standard metric scale 2. Architects' scale 3. Engineers' scale 4. Mechanical drafting scale

V. PLANNING AND DESIGN (C.) Estimated Time: 6 hours

MAJOR OBJECTIVE: To acquire an understanding of the relationship of planning and design to graphic communications, and to develop basic skills in planning and designing the messages and products of graphic communications.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Integrate and emphasize planning and design throughout all modules in graphic communications.	
A. PLANNING FOR GRAPHIC COMMUNICATIONS The student should be able to:		
1. define graphic communications;	Discuss the relationship of graphic communications to communication and to graphic arts. Have the students prepare definitions of communication and graphic communications for the vocabulary section of their notebooks. Make the students aware that communication is a basic human and business need that has increased from the earliest times to the present. Point out the relationship between communication and graphic communication and the changes in the methods of graphic communication from the cave dwellers to the present era.	COMMUNICATION: The process of conveying a message from one person or group of people to another GRAPHIC COMMUNICATIONS: The process of using symbols, photographs, and drawings to transmit a visual message OR Communication through the use of printed images

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
2. explain the purpose and the importance of graphic communications;	Through the use of examples, emphasize that most printing and graphics convey a message from one person or group of people to another. Have the students study the examples and identify the message, the purpose of the message, and to whom the message is being directed. Refer to designs for graphic communications, to show that a design is worthless if the message is omitted and/or is not clear to the person(s) for whom the message is intended. Have the students prepare bulletin board displays or illustrated reports about the purpose and the importance of graphic communications.	"Graphic Communications - We Used to Call It Printing"(sound color 16 mm film), Photo Products Introduction to Graphic Arts, American Technical Society, Unit 1 Understanding Graphic Arts, South-Western Publishing Company, Unit 3 Graphic Communications, McKnight Publishing Company, Chapter 1
3. define planning;	Have the students discuss and prepare a definition for planning to be included in the vocabulary section of their notebooks. Point out that planning is a key element related to managing and completing projects in graphic communications. Make the students aware that planning involves two important resources: people and things.	PLANNING: The process of identifying and preparing details Graphic Communications, McKnight Publishing Company, pp. 56-62
4. develop an understanding of the importance of planning;	Explain the relationship between planning and graphic communications. Make the students aware of the necessity of planning in order to complete the four stages of graphical messages and the varied and related activities. Have	STAGES OF GRAPHIC MESSAGES 1. Design 2. Composition 3. Reproduction and production 4. Binding, finishing, packaging

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	the students discuss the following concepts: humans create thoughts; thoughts take shape in words; words develop into ideas; and ideas form a plan. Discuss the effect of legal restrictions relating to counterfeiting, copyright, and printing offensive literature as they pertain to planning and designing graphic communications.	
5. identify the components of planning.	Emphasize that planning for graphic communications is a process of cooperation of many people using resources and equipment to meet the needs of society, business, and industry.	COMPONENTS OF PLANNING 1. Formulating 2. Researching 3. Designing 4. Engineering
	List, discuss, and define the components of planning. Make the students aware of the importance and relationship of long-term and short-term planning.	FORMULATING: The process of deciding what to make to meet needs RESEARCHING: The process of gathering facts to assist with decision-making DESIGNING: The process of developing and creating a plan
	Emphasize the importance of scheduling and coordinating the four planning stages in order to organize and to complete projects. Point out that improper planning may lead to waste of motion, materials, and effort, resulting in higher costs.	ENGINEERING: The process of adding details to design and of scheduling for completion

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
B. DESIGN The student should be able to:		
1. recognize the fundamentals of design;	Review the definition of designing. Point out that design functions may differ among the various kinds of graphic communications, but that certain principles of design apply to all products of graphic communications.	
	Discuss the following principles of design: balance, proportion, emphasis, harmony, and rhythm. Make the students aware of the ways in which the principles of design apply to all graphic communications.	Drawing and Planning for Industrial Arts, 3rd ed., Chas. A. Bennett Co., Inc., Unit 22
	Display or have the students collect examples of various types of graphic communications which illustrate each of the principles. Have groups of students develop posters, charts, bulletin board displays, and illustrated reports about each of the design principles and their application to graphic communications.	Graphic Arts, McKnight Publishing Company, Chapter 2 The Basic Book of Graphic Arts, American Technical Society, Unit 6 Graphic Arts Fundamentals, The Goodheart-Willcox Company, Inc., Unit 13 Understanding Graphic Arts, South-Western Publishing Company, Part I, Unit 3

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
2. explain the relationship of design to strength, function, appearance, materials, cost, and quality;	Discuss the influence of the design guidelines on the design process. Have the students consider the following questions during the discussion: a) Strength. Will the design make the product strong and durable? b) Function. Does the design fit the purpose and fulfill the need for which it was planned? c) Appearance. Do the parts create interest, appear to belong together, provide proportion in balance, and present a pleasing appearance when brought together? d) Materials. Have the materials been used effectively and are their qualities emphasized to the fullest? e) Cost. Does cost relate to strength, function, appearance, materials, and quality of finished work? f) Quality. Is quality an inherent part of the finished work? Point out that these guidelines are common and necessary to all designs and are interrelated.	DESIGN GUIDELINES 1. Strength 2. Function 3. Appearance 4. Materials 5. Cost 6. Quality

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
3. identify the steps in the design process.	Explain and discuss the steps in the design process. Make the students aware of the relationship between each of the steps and to the design process for the development of graphic communications projects. Encourage the students to consider projects as design problems. Discuss the following, related to design problems: a) State the problem. What is the purpose of the project and how will it be used? b) Think through the problem. What must the project do? How can it be done? What are some of the limitations to be considered? In what ways have other people solved similar problems? c) Develop ideas. What types of sketches are needed to portray the ideas and to determine the materials required to carry out the ideas? d) Make models. Which ideas should be selected and what techniques should be used to prepare the models? e) Prepare comprehensive layouts. How should the comprehensive layout be developed and prepared? f) Construct the project. How should the comprehensive layout be used to complete the project?	STEPS OF DESIGN PROCESS 1. Identify problems 2. Apply resources 3. Formulate ideas 4. Record ideas 5. Refine the product 6. Present the product The Basic Book of Graphic Arts, American Technical Society, Unit 6

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Have the students keep notebook records of their own ideas and ideas collected from periodicals, newspapers, advertisements, and reference books. Encourage the students to read and study publications on design in order to develop an understanding of the relationship between products and design. Point out that it takes time and practice to acquire the skill and knowledge to solve design problems. Make the students aware of the relationship of planning and design to sketching, mechanics of drawing, and design concepts.	Newspapers, periodicals, reference books

VI. CONSUMERISM (C.)

Estimated Time: 3 hours

MAJOR OBJECTIVE: To explore and to relate the complexity of the economic system and the economy to graphic communications and consumer awareness.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Integrate and emphasize instruction, practice, and applications of consumerism to businesses and individuals throughout each module in graphic communications.	
A. ECONOMIC SYSTEMS AND GRAPHIC COMMUNICATIONS The student should be able to:		
1. define economic system;	Explain the term economic system. Emphasize that the economic system refers to the following: a) The way individual workers and managers, productive organizations such as factories or farms, and government agencies are linked together to form a system, a unit, or an organization; b) The way decisions are made as to what the workers, productive organizations, and government agencies will do to determine answers to basic economic questions each nation, province, and local community faces.	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	List and discuss the basic economic questions. Point out how these questions relate to graphic communications industries, products and services, and consumers of these products and services. Explain the purpose and use of consumer surveys to attempt to answer the basic economic questions. Make the students aware that political, social, religious, and moral systems influence economic systems, and that economic systems change from one country to another and within a single country over a period of time. Point out that any type of economic system creates the use and consumption of graphic communications goods and services.	BASIC ECONOMIC QUESTIONS 1. What to produce? 2. How to produce? 3. Who will use and receive the finished services and products? 4. How much to produce over a period of time?
2. explain the basic parts of economic systems;	Identify and discuss the basic parts of economic systems required for production of goods and services: inputs, processes, and outputs. Make the students aware of the relationship of these parts to graphic communications businesses, products, and services. Emphasize the following: a) Outputs are goods and services produced by an economic system.	BASIC PARTS OF ECONOMIC SYSTEMS 1. Inputs 2. Processes 3. Outputs

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	b) Processes are the work activities required to produce goods and services. c) Inputs are the resources required for the work activities to produce goods and services. Have the students give examples of outputs, processes, and inputs for work activities related to graphic communications and to graphic communications services and products.	
3. identify the basic types of inputs.	Review the definition of inputs. List and discuss the basic types of inputs. Emphasize that the basic inputs are common to various types of enterprises/organizations such as schools, families, clubs, businesses. Discuss the relationship among the basic inputs and their application to production of graphic communications goods and services for consumption by businesses and individuals.	BASIC TYPES OF INPUTS 1. People 2. Knowledge and skills 3. Industrial resources 4. Utilities 5. Finance
B. GRAPHIC COMMUNICATIONS AND CONSUMERISM The student should be able to:		
1. identify human needs;	Make the students aware of the importance of understanding the following human needs: physical, societal, in-	MASLOW'S HIERARCHY OF HUMAN NEEDS 1. Physical

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	tellectual, and emotional. Refer to Maslow's hierarchy of human needs. Relate these needs to the products of graphic communications. Have the students identify some of the basic physical, societal, intellectual, and emotional needs. Point out the relationship between these needs and graphic communications work activities services and products.	2. Security 3. Love and acceptance 4. Esteem 5. Self-actualization
2. explain how graphic communications meet human needs;	Emphasize that graphic communications products are available in different societal and economic systems. Have the students compile lists, prepare bulletin board displays, or write illustrated reports on the different types of products in graphic communications, to explain the need of society and individuals for each type. Ask the students to discuss and explain how graphic communications services and products assist individuals to meet basic needs.	
3. recognize the relationship between graphic communications and the economy.	Discuss the importance of industrial and business activities to the national, provincial, regional, and local levels of the economy. Have the students investigate the effects of industrial and business activities on employment and businesses, related to graphic communications. Make the students aware of the ways in which industries, businesses, and individuals use graphic communications to produce goods and services for consumption.	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
C. GRAPHIC COMMUNICATIONS AND THE MARKET PLACE	Point out why prospective users of graphic communications services and products should develop an understanding of the market place and its relationship to the economy.	
The student should be able to:		
1. differentiate between needs and wants;	Have the students compile lists of the graphic communications services and products individuals may desire. Differentiate between needs and wants. Make the students aware of businesses that need and want the services and products of graphic communications.	The World of Business: A Canadian Profile, Wiley Publications of Canada, Limited, Chapter 18, Unit C NEEDS: The things an individual must have for basic survival WANTS: The things an individual would like to have for pleasure and comfort
2. recognize the concept of quality versus cost;	Discuss with students the following concepts: quality versus cost, influence of demand on supply and cost, the state of the economy, financing, and advertising. Relate these concepts to the consumers and producers of the services and products of graphic communications. Make the students aware of the relationship of the above concepts to the following aspects of graphic communications services and products:	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	- planning and design; - human needs; - availability and use of resources; - employment; - availability and choice of the various services and products of graphic communications.	
4. describe the effects of inflation;	Explain the major causes and effects of inflation. Discuss the effect of inflation on individuals, businesses, and industries in general, and graphic communications industries and related businesses in particular.	
5. identify the positive and negative aspects of credit buying.	Point out the direct and indirect costs of credit to individuals and businesses. Explain the advantages and disadvantages of consumer purchasing on credit. Have the students compare the cost of graphic communications items purchased on cash and credit terms by individuals and businesses.	
D. ROLE OF GRAPHIC COMMUNICATIONS IN CONSUMERISM The student should be able to:		
1. recognize the importance of the services and products of graphic communications;	With the students, discuss the influence of graphic communications on businesses and individuals. Point out that the services and products of graphic communications are very important to every	Understanding Graphic Arts, South-Western Publishing Company, Part I, Unit I

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	individual and business. Indicate that everyone must understand and assess the messages disseminated through the various media of graphic communications.	
2. collect information and examples of graphic communications;	Have the students discuss and prepare displays of examples of graphic communications used by individuals and businesses. Make the students aware of the influence of graphic communications on the production of products, and, consequently, on individuals and businesses who use and consume the products. Emphasize that an awareness of communication and production processes in graphic communications will aid people and businesses to become wiser and more alert consumers.	
3. explain the relationship between graphic communications and advertising.	Discuss and have the students explain the relationship of the processes of graphic arts to graphic communications and to advertising. Show the students how graphic communications used to prepare advertisements influence the selection of products and services. Review the advertising code and make the students aware of its impact on various types of advertisements.	

VII. SKETCHING (C.) Estimated Time: 4 hours

MAJOR OBJECTIVE: To gain knowledge about and to explore skills, techniques, and applications of freehand sketching for graphic communications.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	NOTE: Refer to Module VII, Sketching, in the drafting area of study. Integrate and emphasize sketching as required in modules of graphic communications. Emphasize the relationship of sketching to measurement, planning and design, mechanics of drawing, pictorials, orthographics, and design concepts.	Industrial Arts 7-9: Graphic Communications (Drafting, Graphic Arts, Graphic Communications), Module VII, Sketching

VIII. MECHANICS OF DRAWING (C.) Estimated Time: 4 hours

MAJOR OBJECTIVE: To obtain knowledge and to develop skills in the use of drafting tools and materials; and to apply knowledge and drafting techniques to lines, dimensioning, and hand lettering for graphic communications.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	NOTE: Refer to Module VIII, Mechanics of Drawing, in the drafting area of study. Emphasize the following layout tools and related techniques as they apply to graphic communications: T-square, triangles, layout pads, pencils, erasers, pentel, line gauge, crayons, pastel sticks, compass, stick-on type and figures, fixative, charcoal, ink and pens, tracing table, and shading sheets.	Industrial Arts 7-9: Graphic Communications (Drafting, Graphic Arts, Graphic Communications), Module VIII, Mechanics of Drawing

IX. PICTORIAL DRAWING (C.) Estimated Time: 8 hours

MAJOR OBJECTIVE: To explore the significance of and to develop knowledge and drafting skills related to pictorial drawing for communicating graphically.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	NOTE: Refer to Module IX, Pictorial Drawing, in the drafting area of study.	Industrial Arts 7-9: Graphic Communications (Drafting, Graphic Arts, Graphic Communications), Module IX, Pictorial Drawing
	Point out that pictorial drawings are used in graphic messages prepared for advertising brochures, pamphlets, telephone book yellow pages, repair and service manuals, parts catalogues, and textbooks.	Graphic Communications, McKnight Publishing Company, Chapter 4, pp. 99-104

X. ORTHOGRAPHIC DRAWING (C.)

Estimated Time: 8 hours

MAJOR OBJECTIVE: To explore the purpose of and to develop understanding and drafting skills in sectional and auxiliary views and pattern development, applicable to orthographic drawing for communicating graphically.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	NOTE: Refer to Module X, Orthographic Drawing, in the drafting area of study. Emphasize that orthographic projection drawings are used to communicate graphically when accurate details and dimensions must be made available.	Industrial Arts 7-9: Graphic Communications (Drafting, Graphic Arts, Graphic Communications), Module X, Orthographic Drawing Graphic Communications, McKnight Publishing Company, Chapter 4, pp. 98-99

XI. DRAWING INTERPRETATION (C.)

Estimated Time: 3 hours

MAJOR OBJECTIVE: To recognize the significance of drawing interpretation and to apply the process to manufacturing, construction, assembly, and layout drawings for communicating graphic messages.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Integrate drawing interpretation where applicable in the graphic communications area of study. Discuss and have the students research the following in relation to reading and interpreting drawings: a) The skills are necessary for some individuals and useful for others. b) More people require these skills than the drawing skills. c) In everyday life, the skills are helpful in understanding building plans; assembly, maintenance, and operating instructions for manufactured products; and plans and specifications for many hobbies and spare-time activities.	
A. INTRODUCTION TO DRAWING INTERPRETATION The student should be able to:		
1. recognize the necessity of reading and interpreting drawings;	Emphasize the importance of being able to understand and interpret accurately technical designs, illustrations, and	Graphic Communications, McKnight Publishing Company, Unit 3

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	drawings because they are universal forms of graphic communication.	
2. identify the various types of drawings used as inserts in graphic messages.	Display or have the students collect examples of graphic messages which contain the following types of inserts: manufacturing drawings, construction drawings, assembly drawings. Point out that knowledge and skill are required for interpreting drawings in order to use them effectively to enhance or clarify graphic messages. Indicate that layouts of graphic messages require interpretation by many people, just as do plans and models for buildings and industrial products.	Examples of graphic messages with various types of drawings used as inserts
B. MANUFACTURING DRAWINGS		
The student should be able to:		
1. recognize conventions related to manufacturing drawings;	Show the students examples of manufacturing drawings and have them identify the following conventions: standard symbols, line and material indicators, abbreviations, orthographic projections, and dimensioning.	
2. read and interpret drawing conventions in manufacturing drawings.	Provide the students with copies of graphic messages, brochures, and articles which contain inserts of manufacturing drawings. Ask the students to answer questions about the drawings.	

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
C. CONSTRUCTION DRAWINGS		
The student should be able to:		
1. recognize the conventions of simple construction drawings;	Display or hand out simple construction drawings. Point out and explain the standard symbols, abbreviations, material delineations, or dimensioning.	
2. read and interpret simple construction drawings.	Have the student locate newspaper examples of construction drawings to illustrate the floor plan and/or view of a house. Ask the students to answer questions about the floor plan or view.	Newspapers Blueprint Reading for Construction, The Goodheart-Willcox Company, Inc.
D. ASSEMBLY DRAWINGS		
The student should be able to:		
1. recognize conventions of simple assembly drawings;	Have the students prepare bulletin board displays of assembly drawings for model airplanes, toys, and furniture, published in periodicals, brochures, and books. Ask the students to locate and explain the following conventions: numbers designating components, overall dimensions, capacity dimensions, relationship dimensions between parts, operating instructions, and data on design characteristics.	Assembly drawings Graphic Communications, McKnight Publishing Company, Unit 3

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
2. read and interpret simple assembly drawings.	Ask the students to read and interpret simple assembly drawings. Acquaint them with the following uses of assembly drawings: - to provide assembly information for inclusion in sales literature and parts catalogues; - to show how the parts/sections of the product fit together; - to indicate how the parts of the product relate to each other; - to provide information for disassembling a product.	
E. LAYOUTS FOR GRAPHIC COMMUNICATIONS		
The student should be able to:		
1. recognize the conventions of layouts for graphic messages;	Provide the students with examples of layouts for graphic messages. Begin with simple layouts and progress to increasingly more difficult layouts. Explain the various conventions used in the layouts.	Layouts for graphic messages Graphic Communications, McKnight Publishing Company, Unit 3
2. read and interpret layouts for graphic messages.	Have the students read and interpret layouts to complete graphic messages.	

XII. DESIGN CONCEPTS (C.)

Estimated Time: 4 hours

MAJOR OBJECTIVE: To recognize the importance of design factors, design elements and principles, pre-printed and photo composition; and to incorporate these design concepts into the layouts for printed messages.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	NOTE: Refer to Module VII, Design Concepts, in the graphic arts area of study. Emphasize that graphically communicated messages require careful planning and preparation in order to fulfill specific needs and accomplish specific purposes. Have the students discuss the relationship of the following factors to the process of message analysis: age, sex, social status, economic level, personality, intelligence, reading ability, attitude and interest of the audience to whom the message is directed. Point out that the many decisions necessary to produce graphic messages require careful consideration to prevent waste of resources, money, and time. Discuss how a knowledge of graphic communication techniques will assist with the planning and designing of attractive, functional graphic messages.	Industrial Arts 7-9: Graphic Communications (Drafting, Graphic Arts, Graphic Communications), Module VII, Design Concepts Graphic Communications, McKnight Publishing Company, Section II, Chapter 2

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	Emphasize that the principles of design serve as guidelines and must harmonize in order for successful message presentation. To help the students realize the variety of communication needs in the world, have them select different types of businesses and work in groups to determine the graphic message needs of each type of business.	

XIII. SCREEN-PROCESS PRINTING (C.) Estimated Time: 8 hours

MAJOR OBJECTIVE: To determine the significance of screen-process printing; and to develop skills and knowledge related to preparing and using hand-cut paper and film stencils, indirect and direct photographic stencils in screen-process printing for communicating messages graphically.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	NOTE: Refer to Module VIII, Screen-Process Printing, in the graphic arts area of study. Make the students aware of the relationship of sketching, measurement, planning and design, and design concepts to graphic communication through screen-process printing. Explain that screen-process printing is accomplished by forcing ink through prepared stencils, which are adhered to a piece of tightly stretched, open-weave material. Have the students determine the purposes, advantages, types of material, and methods of preparing the stencils for screen printing graphic messages. Discuss and emphasize safety precautions and procedures, and conservation of materials and supplies through careful planning and correct procedures.	Industrial Arts 7-9: Graphic Communications (Drafting, Graphic Arts, Graphic Communications), Module VIII, Screen-Process Printing Graphic Communications, McKnight Publishing Company, Chapter 7, Units 20-28

XIV: RELIEF PRINTING (C.) Estimated Time: 8 hours

MAJOR OBJECTIVE: To explore the development and purpose of relief printing; to gain knowledge and skills, and to participate in experiences related to relief printing for communicating graphically.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	NOTE: Refer to Module IX, Relief Printing, in the graphic arts area of study.	Industrial Arts 7-9: Graphic Communications (Drafting, Graphic Arts, Graphic Communications), Module IX, Relief Printing
	Point out that graphic messages may be prepared by relief printing, often called "letterpress."	
	Discuss the application of measuring, planning and design, design concepts, photography, and safety to preparing graphic messages by the relief printing procedures and processes.	Graphic Communications, McKnight Publishing Company, Chapter 6, Units 13-18

XV. BLACK AND WHITE PHOTOGRAPHY (C.)

Estimated Time: 8 hours

MAJOR OBJECTIVE: To recognize the function and principles of black and white photography; to acquire knowledge about the skills, techniques, and applications of black and white photography for graphic communications.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	NOTE: Refer to Module X, Black and White Photography, in the graphic arts area of study. Emphasize the ways in which black and white photography enhances graphic messages. Discuss the relationship of black and white photography to layout of messages, planning and design, design concepts, printing processes, and safety in preparation and use of graphic messages.	Industrial Arts 7-9: Graphic Communications (Drafting, Graphic Arts, Graphic Communications), Module X, Black and White Photography Graphic Communications, McKnight Publishing Company, Chapter 10 How Does a Picture Mean? (kit), Library, Manitoba Department of Education Making Sense Visually (kit), Library, Manitoba Department of Education

XVI. PROCESS PHOTOGRAPHY (C.) Estimated Time: 6 hours

MAJOR OBJECTIVE: To gain knowledge about the significance of process photography; to acquire skills and techniques; and to apply process photography to communicating graphically.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	NOTE: Refer to Module XI, Process Photography, in the graphic arts area of study.	Industrial Arts 7-9: Graphic Communications (Drafting, Graphic Arts, Graphic Communications), Module XI, Process Photography
	Discuss the uses and techniques of process photography in planning, designing, preparing, and enhancing graphic messages. Discuss and emphasize safety precautions and procedures.	Graphic Communications, McKnight Publishing Company, Chapter 9, Unit 31

XVII. PLANOGRAPHIC PRINTING (C.) Estimated Time: 10 hours

MAJOR OBJECTIVE: To recognize the development, significance, and principles of planographic printing; to acquire knowledge and explore skills pertinent to plate preparation and press operation for communicating graphically by the lithographic processes.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	NOTE: Refer to Module XII, Planographic Printing, in the graphic arts area of study.	Industrial Arts 7-9: Graphic Communications (Drafting, Graphic Arts, Graphic Communications), Module XII, Planographic Printing.
	Indicate that planographic printing is referred to as lithography, photo-lithography, photo-offset lithography, and offset lithography.	Graphic Communications, McKnight Publishing Company, Chapter 9, Units 31-41
	Make the students aware of the relationship of planographic printing to sketching, measurement, planning and design, design concepts, process photography, and safety precautions.	

XVIII. INTAGLIO PRINTING (C.)

Estimated Time: 3 hours

MAJOR OBJECTIVE: To determine the development, importance, and principles of intaglio printing; and to acquire knowledge and explore skills related to plate preparation pertinent to communicating messages graphically.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	NOTE: Refer to Module XIII, Intaglio Printing, in the graphic arts area of study.	Industrial Arts 7-9: Graphic Communications (Drafting, Graphic Arts, Graphic Communications), Module XIII, Intaglio Printing
	Point out that intaglio (in-tal-yo) printing, often termed "gravure" printing, is defined as "printing from cells or depressions that are below the surface of the printing plate."	
	Discuss the relationship of intaglio printing to sketching, measurement, planning and design, design concepts, and safety procedures.	Graphic Communications, McKnight Publishing Company, Chapter 6

XIX. PACKAGING AND PRESENTATION (C.)

Estimated Time: 3 hours

MAJOR OBJECTIVE: To recognize the significance of packaging and presentation; to gain knowledge and explore skills and techniques pertinent to finishing, binding, packaging, and distributing processes for communicating graphically.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	NOTE: Refer to Module XIV, Packaging and Presentation, in the graphic arts area of study. Indicate that binding, finishing, and packaging are the final steps in the graphic communication reproduction process. Emphasize that finishing and binding are important processes in preparing attractive visual communication materials. Point out that the nature and purpose of the printed communication often dictate the binding and finishing operations to be performed. Have the students determine the uses, advantages, and disadvantages of the various types of binding. Discuss and have the students prepare reports or displays of the following basic ways of distributing graphic communication materials: a) Directly - distributing by person-to-person, or sender to an assembled	Industrial Arts 7-9: Graphic Communications (Drafting, Graphic Arts, Graphic Communications), Module XIV, Packaging and Presentation Graphic Communications, McKnight Publishing Company, Chapters 1, 12, 13, 14

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	audience; e.g., slides, movies, filmstrips, overhead projections closed-circuit television, videotape television, and certain printed materials. b) Transporting - moving communicating material from its production point to a destination where the audience is located; e.g., road, rail, water, and air. Materials to be transported must be packaged, and that packaging serves several functions including: information about destination and origination, protection, handling, and sanitation. c) Transmission - distributing through electrical, electronic, or light signals; e.g., wire and cable broadcast, communication satellite, laser beams, and microwave networks. Emphasize that the packaging operation often depends upon the method selected for distribution of the printed message.	

XX. COLOR PHOTOGRAPHY (O.)

Estimated Time: 10 hours

MAJOR OBJECTIVE: To explore the significance of color photography and to acquire knowledge and skills in color photography to communicate graphically.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	NOTE: Refer to Module XV, Color Photography, in the graphic arts area of study. Emphasize the ways in which color photography enhances graphic communications. Discuss the relationship of color photography to the layout of message, planning and design, design concepts, printing processes, and safety in preparation and use of graphic messages.	Industrial Arts 7-9: Graphic Communications (Drafting, Graphic Arts, Graphic Communications), Module XV, Color Photography Graphic Communications, McKnight Publishing Company, Unit 43

XXI. OFFICE GRAPHIC ARTS EQUIPMENT (O.)

Estimated Time: 2 hours

MAJOR OBJECTIVE: To gain an understanding and an appreciation of the developments, processes, and skills related to office equipment for communicating graphically.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	NOTE: Refer to Module XVI, Office Graphic Arts Equipment, in the graphic arts area of study. Explain that schools, businesses, and other commercial enterprises need fast and inexpensive ways of communicating with employees and other people. Point out that office graphic arts equipment serves the purpose of quickly duplicating graphic messages for hand or mail distribution. Emphasize the influence of technology on office graphic arts equipment.	Industrial Arts 7-9: Graphic Communications (Drafting, Graphic Arts, Graphic Communications), Module XVI, Office Graphic Arts Equipment

XXII. ELECTRONIC SYSTEMS (O.)

Estimated Time: 2 hours

MAJOR OBJECTIVE: To acquire an understanding and an appreciation of the influence and functions of computers and computer-directed devices on planning, designing, and communicating messages graphically.

TOPICS AND OBJECTIVES	SUGGESTED ACTIVITIES AND NOTES	RESOURCES
	NOTE: Refer to Module XVII, Electronic Systems, in the graphic arts area of study. Have the students research, through reading and visiting industries, and prepare reports on current word processor technology as it applies to printing.	Industrial Arts 7-9: Graphic Communications (Drafting, Graphic Arts, Graphic Communications), Module XVII, Electronic Systems

bibliography

BIBLIOGRAPHY

DRAFTING

TEXTBOOKS

Jensen, Cecil et al. Drafting Fundamentals, 5th ed. SI Metric. Scarborough, ON: McGraw-Hill Ryerson, Ltd., 1982.

Rohlmeier, Charles. Drafting Metric. Chicago, IL: American Technical Society, 1980. (Distributed by Copp Clark Pitman.)

Walker, John R. Exploring Metric Drafting Basic Fundamentals. South Holland, IL: The Goodheart-Willcox Company, Inc., 1980. (Distributed by General Publishing Company, Ltd.)

REFERENCE BOOKS

Campbell, S. R. The Confident Consumer. South Holland, IL: The Goodheart-Willcox Company, Inc., 1982. (Distributed by General Publishing Company, Ltd.)

Canada Department of Manpower and Immigration. The Canadian Classification and Dictionary of Occupations. Ottawa, ON: The Department, 1971-1973.

----------. CAREERS Manitoba 1981, Volumes 1, 2, 3, 4. Ottawa, ON: The Department, 1981.

----------. Creating a Career, Instructor's Manual. Ottawa, ON: The Department, 1977.

----------. Creating a Career, Student's Book. Ottawa, ON: The Department, 1977.

----------. Training Manual for Canadian Classification and Dictionary of Occupations, Vol. 1. Ottawa, ON: The Department, 1972.

Canada Handbook. Ottawa, ON: Information Division, Statistics Canada, current year.

Canada Yearbook. Ottawa, ON: Information Division, Statistics Canada, current year.

Darbyshire, David T. Drafting Basics. Don Mills, ON: Academic Press Canada, 1982.

Feirer, John L. et al. Basic Drafting. Peoria, IL: Chas. A. Bennett Company, Inc., 1978. (Distributed by Copp Clark Pitman.)

Feirer, John L. Drawing and Planning for Industrial Arts, 3rd ed. Peoria, IL: Chas. A. Bennett Company, Inc., 1978. (Distributed by Copp Clark Pitman.)

Henderson, Brian L. Exploring Industrial Arts. Scarborough, ON: McGraw-Hill Ryerson, Ltd., 1983.

Laustrup, Jes et al. Exploring Industrial Education, 2nd ed. SI Metric. Scarborough, ON: McGraw-Hill Ryerson, Ltd., 1978.

Manitoba Department of Education. Safety/Health Guide for Industrial Arts, Vocational, Home Economics, and Business Education. Curriculum Support Series. Winnipeg: The Department, 1981.

Business Education. Curriculum Support Series. Winnipeg: The Department, 1981.

----------. The Manitoba Career Guide. Winnipeg: The Department, n.d.

Manitoba Trade Directory. Winnipeg, MB: Sanford Evans Publishing, Limited, 1982.

Miller, Wilbur R. et al. Drafting. Bloomington, IL: McKnight Publishing Company, 1978. (Distributed by Nelson Canada.)

Morrisey, Thomas J. Communication: Drafting. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1976.

Murphy, Terry G. et al. The World of Business: A Canadian Profile. Toronto, ON: Wiley Publishers of Canada, Ltd., 1978.

Ontario Federation of Labour. Occupational Health and Safety: A Training Manual. Toronto, ON: Copp Clark Pitman, 1982.

Ross, Stan. The World of Drafting. Bloomington, IL: McKnight and McKnight Publishing Company, 1971. (Distributed by Nelson Canada.)

Wallach, Paul I. Basic Architectural Drafting. Cincinnati, OH: South-Western Publishing Company, 1982. (Distributed by Gage Publishing Ltd.)

----------. The Basic Book of Drafting. Chicago, IL: American Technical Society, 1979. (Distributed by Copp Clark Pitman.)

Wood, John C. Looking at the Consumer. Agincourt, ON: Gage Publishing, Ltd., 1981.

MANITOBA LAW STATUTES

The Workers' Compensation Act, Manitoba Law Statutes, 1976-1979.

The Workplace Safety and Health Act, Manitoba Law Statutes, 1977-1978.

AUDIO-VISUAL MATERIALS

The following audio-visual materials, published by DCA Educational Products, Warrington, PA 18976, are available from Administration Information Media (AIM) Educational Aids, P. O. Box 86704, North Vancouver, BC V7L 4L2:

1. Multicolored Transparencies with Overlays, Booklet for Students and Instructors, and Library Case

    a) The ABC's of Drafting, Group I Basic Skills
    - English vs The Language of Graphics (ABC-1)
    - What Drawings Tell You (ABC-2)
    - Arbitrary Standards (ABC-3)
    - Drafting Tools (ABC-4)
    - Lettering (ABC-5)
    - Sketching Lines, Circles and Arcs (ABC-6)
    - Changing the Size of Squares (ABC-7)
    - Block Letters (ABC-8)
    - More Block Letters and Numbers (ABC-9)
    - Fastening The Paper (ABC-10)
    - Drawing Lines and Angles (ABC-11)
    - Alphabet of Lines (ABC-12)
    - Common Figures (ABC-13)
    - Drawing Circles and Squares (ABC-14)
    - Drawing Geometric Figures (ABC-15)

    b) The ABC's of Drafting, Group II Size and Shape Descriptions

- Height, Width and Depth of Views and Faces (ABC-16)
- Size Description Systems (ABC-17)
- Dimensioning View and Pictorial Drawings (ABC-18)
- Projection Planes (ABC-19)
- Orthographic Drawing Procedures (ABC-20)
- Auxiliary View Procedures (ABC-21)
- Section View Procedures (ABC-22)
- Orthographic Drawing Grid (ABC-23)

c) The ABC's of Drafting, Group III Pictorial
- Oblique Drawing Procedures (ABC-24)
- Bird's and Worm's Eye Views (Oblique) (ABC-25)
- Oblique Drawing Grid (ABC-26)
- Isometric Drawing Procedures (ABC-27)
- Bird's and Worm's Eye Views (Isometric) (ABC-28)
- Isometric Drawing Grid (ABC-29)
- One-Point Perspective Drawing Procedures (ABC-30)
- Six Positions (One-Point Perspective) (ABC-31)
- One-Point Perspective Drawing Grid (ABC-32)
- Two-Point Perspective Drawing Procedures (ABC-33)
- Three Positions (Two-Point Perspective) (ABC-34)
- Two-Point Perspective Drawing Grid (ABC-35)
- View Drawing and Pictorial Drawing Completion (ABC-36)

2. Multicolored Transparencies with Overlays, Instructor's Guide, and Library Case

a) Metric System, Group I Metric Units
- Think Metric (MET-1)
- English Measuring Units (MET-2)
- International System of Metric Units (MET-3)
- Some Metric Units for Everyday Use (MET-4)
- The Metric Dollar (MET-5)
- The Metre (MET-6)
- The Kilogram (MET-7)
- Capacity (MET-8)
- Area (MET-9)
- Temperature (MET-10)
- Metric System Prefixes (MET-11)

b) Metrics on the Drawing Board
- The Metre and Its Subdivisions (MDB-1)
- Metric Measuring Drill (MDB-2)
- Multiple Metre Distances (MDB-3)
- ISO Paper Sizes (MDB-4)
- A Completely Metric Drawing (MDB-5)
- Rounding Off Decimals (MDB-6)
- Metric Drawing Scales (MDB-12)
- Metric Drawing Scales (cont'd) (MDB-13)
- Dual Dimensioning (MDB-14)
- Mass Specifications (MDB-15)
- Volume Specifications (MDB-16)
- Temperature Specifications (MDB-17)
- Force, Pressure, and Stress Specifications (MDB-18)
- Architectural Dimensioning (MDB-20)

The following audio-visual materials are available from Copp Clark Pitman, 517 Wellington Street West, Toronto, ON M5V 1G1.

Filmstrips 35 mm, Cassettes and Teacher's Manual

Drafting and Industrial Drawings
- Alphabet of Lines (812302)
- Dimensions and Symbols (812304)
- Working Drawings: Pictorial Drawings (812314)
- Working Drawings: Orthographic Projection (812312)
- Working Drawings: Special Views (812316)

The following audio-visual materials are available from Library, Manitoba Department of Education, 1181 Portage Avenue, Winnipeg, MB R3G 0T3.

1. 16 mm Films

- If I Had a Hammer (color)
- Drawing and Planning (color)
- Drafting Tips (black and white)
- Working Safely in the Shop (black and white)

2. Kits (Color Slides, Cassettes, Carousel Slide Trays)

- Aircraft Mechanic
- Architectural Drafting
- Career of an Automechanic
- A Career in Cabinet Making
- Careers in Graphic Arts
- Silkscreening
- The Electrician Kit
- The Machinist in the Plastic Moulding Industry
- Sheet Metal Working is . . .

3. Videorecordings (Career Awareness Resource Library)

- Carpentry B-2
- Chemical and Plastics Processing F-1
- Concrete Finishing B-3
- Drafting O-4
- Electrical and Electronic Engineering A-8
- Electrical Power, Lighting, and Wire Communications B-4
- Electronic Products Manufacturing G-6
- General Manufacturing G-8
- Graphic Arts O-6
- Insulating and Roofing Occupations B-6
- Mechanics O-9
- Metal Machining G-11
- Metal Products F-4
- Metal Shaping and Forming G-12
- Photography D-5
- Photographic Processing O-13
- Plastering, Painting and Paper Hanging B-8
- Printing O-14
- Rubber and Plastic Products Manufacturing G-14
- Sheet Metalwork G-15
- Wood Processing F-9
- Wood Products Manufacturing G-19

4. Videorecordings and Viewer's Guide (Fast Forward Series)

- Humanized Technology (Series 1)
- Implications (Series 2)

The following audio-visual materials are available from Prentice-Hall Media, 1870 Birchmount Road, Scarborough, ON M1P 2J7:

1. Color Filmstrips with Cassettes and Program Guide

a) Drafting/Mechanical Drawing
   - Tools and Techniques
   - Isometric Drawings
   - Oblique Drawings
   - Orthographic Drawings
   - Dimensioning

b) Architectural Drawing
   - Lines and Lettering
   - Geometric Constructions: Basic Straight Line Shapes
   - Geometric Constructions: Circles and Arcs
   - Multiview Projection and Sections
   - Dimensioning
   - Floorplans
   - Sections and Details
   - Perspective Sketching

c) Safety
   - On Guard!
   - The Safety Program

- Practicing Safety
- Protecting Your Eyes
- Using Hand and Bench Tools
- Operating Power Machines
- Preparing for Emergencies
- Wounds, Sprains, Fractures
- Shock, Fainting, Burns
- Artificial Respiration

The following audio-visual material is available from Vocational Filmstrip Company, a division of Library Filmstrip Center, 3033 Aloma, Witchita, KS 67211:

Color-Sound Filmstrip

- General Shop Safety

The following audio-visual material is available from the Film Library, Manitoba Hydro, P. O. Box 815, Winnipeg, MB R3C 2P4:

16 mm Film

- The A, B, C's and D's of Portable Fire Extinguishers

The following audio-visual material is available from Manitoba Telephone System, Public Relations Department, 489 Empress Street, Winnipeg, MB R3G 3G9:

16 mm Film

- The Thinking?? Machine
- Incredible Machine

The following audio-visual materials are available from Workplace Safety and Health Division, Department of Labour and Manpower, Norquay Building, Winnipeg, MB R3C 0P8:

Slides

- Guard Your Sight
- Keep It
- Safety Attitudes
- Tips for New Employees
- Your Feet Are Your Fortune

16 mm Films

- Confined Space Hazards
- Everything to Lose, the Split Second
- Housekeeping Means Safekeeping
- The Sound of Sounds
- We'll See Tomorrow

GRAPHIC ARTS

TEXTBOOKS

Hird, Kenneth F. Understanding Graphic Arts. Cincinnati, OH: South-Western Publishing Company, 1982. (Distributed by Gage Publishing Ltd.)

Swerdlow, Robert M. Introduction to Graphic Arts. Chicago, IL: American Technical Society, 1979. (Distributed by Copp Clark Pitman.)

Walker, John R. Graphic Arts Fundamentals. South Holland, IL: The Goodheart-Willcox Company, Inc., 1980. (Distributed by General Publishing Company, Ltd.)

REFERENCE BOOKS

Campbell, S. R. The Confident Consumer. South Holland,

IL: The Goodheart-Willcox Company, Inc., 1982. (Distributed by General Publishing Company, Ltd.)

Canada Department of Manpower and Immigration. The Canadian Classification of Dictionary of Occupations. Ottawa, ON: The Department, 1971-1973.

----------. Careers Manitoba 1981, Volumes 1, 2, 3, 4. Ottawa, ON: The Department, 1981.

----------. Creating a Career, Instructor's Manual. Ottawa, ON: The Department, 1977.

----------. Creating a Career, Student's Book. Ottawa, ON: The Department, 1977.

----------. Training Manual for Canadian Classification and Dictionary of Occupations, Vol. 1. Ottawa, ON: The Department, 1972.

Canada Handbook. Ottawa, ON: Information Division, Statistics Canada, current year.

Canada Yearbook. Ottawa, ON: Information Division, Statistics Canada, current year.

Carlsen, Darvey E. Graphic Arts, 5th ed. Peoria, IL: Chas. A. Bennett Company, Inc., 1977. (Distributed by Copp Clark Pitman.)

Carlsen, Darvey E. et al. Communication: Graphic Arts. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1976.

Feirer, John L. Drawing and Planning Industrial Arts, 3rd ed. Peoria, IL: Chas. A. Bennett Company, Inc., 1978. (Distributed by Copp Clark Pitman.)

Karch, R. Randolph. Basic Graphic Arts Procedures, 4th ed. Chicago, IL: American Technical Society, 1970. (Distributed by General Publishing Company, Ltd.)

Lathrop, Irvin N. et al. The Basic Book of Photography. Chicago, IL: American Technical Society, 1979. (Distributed by Copp Clark Pitman.)

Manitoba Department of Education. Safety/Health Guide for Industrial Arts, Vocational, Home Economics, and Business Education. Curriculum Support Series. Winnipeg, MB: The Department, 1981.

----------. The Manitoba Career Guide. Winnipeg, MB: The Department, n.d.

Manitoba Trade Directory. Winnipeg, MB: Sanford Evans Publishing, Limited, 1982.

Miller, Wilbur R. Graphic Arts. Bloomington, IL: McKnight Publishing Company, 1978. (Distributed by Nelson Canada.)

----------. Photography. Bloomington, IL: McKnight Publishing Company, 1978. (Distributed by Nelson Canada.)

Murphy, Terry G. et al. The World of Business: A Canadian Profile. Toronto, ON: Wiley Publishers of Canada, Ltd., 1978.

Ontario Federation of Labour. Occupational Health and Safety: A Training Manual. Toronto, ON: Copp Clark Pitman, 1982.

Silver, Gerald A. Modern Graphic Arts Paste-Up, 2nd ed.

Chicago, IL: American Technical Society, 1973.
(Distributed by Copp Clark Pitman.)

Spence, William P. et al. Graphic Reproduction.
Peoria, IL: Chas. A. Bennett Company, Inc.,
1980. (Distributed by Copp Clark Pitman.)

Swerdlow, Robert N. The Basic Book of Graphic Arts.
Chicago, IL: American Technical Society, 1979.
(Distributed by Copp Clark Pitman.)

The World Book, Vol. 13. World Book-Childcraft
International.

Wood, John C. Looking at the Consumer. Agincourt,
ON: Gage Publishing, Ltd., 1981.

AUDIO-VISUAL MATERIALS

The following audio-visual materials, published by DCA Educational Products, Warrington, PA 18976, are available from Administration Information Media (AIM) Educational Aids, P. O. Box 86704, North Vancouver, BC V7L 4L2:

1. Multicolored Transparencies with Overlays

   a) Graphic Arts, Group I: What Is Graphic Arts?
      - What is Graphic Arts? (GA-1)
      - The Graphic Arts Industry Is (GA-2)
      - The Graphic Arts Industry Is (GA-3)
      - The Graphic Arts Industry Is (GA-4)

   b) Graphic Arts, Group II: Historical Highlights
      - Early Graphic Communication (GA-5)
      - Egyptian Hieroglyphics (GA-6)
      - Comparison of Three Alphabets (GA-7)

   c) Graphic Arts, Group III: Design
      - Types of Line Illustrations (GA-8)
      - Two-Dimensional Design (GA-35)
      - Page Proportion (GA-36)
      - Balance (GA-37)
      - Contrast (GA-38)
      - Rhythm (GA-39)
      - Unity (GA-40)

   d) Graphic Arts, Group IV: Layout
      - Enlargements and Reductions: Diagonal Line (GA-9)
      - Enlargements and Reductions: Proportional Scale (GA-10)
      - Two-Dimensional Layout (GA-41)
      - Layout Sequence (GA-42)
      - Thumbnail Sketches (GA-43)
      - Rough Layouts (GA-44)
      - Comprehensive Layout (GA-45)

   e) Graphic Arts, Group VII: High Contrast Photography
      - High Contrast Photographic Film (GA-16)
      - A Horizontal Process Camera (GA-17)
      - Enlarging and Reducing with a Process Camera (GA-18)
      - Developing High Contrast Film (GA-19)
      - Photographic Film and Light (GA-56)
      - A Vertical Process Camera (GA-57)
      - Process Camera Focal Length (GA-58)

   f) Graphic Arts Group XII: Finishing and Binding
      - Mechanical Binding Methods (GA-30)
      - Loose-Leaf Binding Methods (GA-31)
      - Wire Staple Binding Methods (GA-32)
      - Sewn Binding Methods (GA-33)
      - Parts of a Book (GA-34)

   g) Photography, Group I: What is Photography?
      - What is Photography? (1)
      - Photography: A Communications Medium (2)

- Photography: A Career (3)
- Photography: FUN (4)

h) Photography, Group II: The Camera
- The Basic Camera (5)
- Viewfinder Camera (6)
- Twin Lens Reflex Camera (7)
- Single Lens Reflex Camera (8)
- View Camera (9)
- The Parallax Problem (10)
- Focusing: 3 Methods (11)
- The Range Finder Principle (12)

i) Photography, Group III: Exposure Controls
- Exposure Control Variables (13)
- Balancing Lens Apertures with Shutter Speeds (14)
- f-Stop and Exposure Time Comparisons (15)
- Camera Shutters: Location (16)
- Shutters: Motion and Light Control (17)
- Shutter Speed (18)
- Photoelectric Exposure Meters (19)
- Photoelectric Exposure Meter Scale (20)
- Using the Photoelectric Exposure Meter (21)

j) Photography, Group IV: Light and Lenses
- The Visible Light Spectrum (22)
- Light Refraction Principle (23)
- Lenses: Simple and Multiple Element (24)
- Circle of Confusion (25)
- Depth of Field Principles (26)
- Depth of Field: Two Controlling Principles (27)
- The f-Number of a Lens (28)
- Lenses: Types and Relative Speeds (29)
- Focal Length: Effect on Image Size (30)
- Lenses: Focal Lengths and Angles of Coverage (35 mm Cameras) (31)
- Lenses: Focal Lengths and Areas of Coverage (35 mm Cameras) (32)
- Lenses: Zoom and Fisheye Types (35 mm Cameras) (33)

k) Photography, Group V: Filters (Black and White Photography)
- The Filter Principle (Panchromatic Film) (34)
- Common Filters and Characteristics (Panchromatic Film) (35)
- The Polarizing Filter (36)
- Filter Factors (37)

l) Photography, Group VI: Film
- Panchromatic Photographic Film (38)
- Photographic Film and Light (39)
- Film Emulsion Ratings (40)
- Processing Roll Film (41)
- Machine Film Processing (42)

m) Photography, Group IX: Composition
- A Good Photograph (59)
- Arrange the Subject: The Rule of Thirds (60)
- Balance: The Key to Good Composition (61)
- Vertical and Horizontal Lines (62)
- Diagonal and S-Curve Lines (63)
- Circular and Zig-Zag Lines (64)
- Framing, Foreground and Horizon Guidelines (65)

n) Photography, Group X: One-Step Photographic Process
- Polaroid-Land Film Pack Camera and Film (66)
- One-Step Photo Principle (Polaroid) (67)
- One-Step Color Reversal Process (Polacolor) (68)
- One-Step Color Reversal Process (Polacolor) B (69)
- The Polaroid SX-70 Land Camera: Cutaway (70)
- The Polaroid SX-70 Land Camera: Optical System (71)
- The Polaroid SX-70 Film Principle (72)

o) Photography, Group XI: Color
   - Additive Process (73)
   - Subtractive Process (74)
   - Reproduction Colors by the Color Negative System (75)
   - Reproduction of Colors by the Reversal Color Film (Ektachrome) (76)
   - Reversal Color Film Processing Concept (77)
   - Color Temperature (78)

The following audio-visual materials are available from Library, Manitoba Department of Education, 1181 Portage Avenue, Winnipeg, MB R3G 0T3:

1. 16 mm Films

   - Blue Sky Thinking (color)
   - If I Had a Hammer (color)
   - Drawing and Planning (color)
   - Working Safely in the Shop (black and white)

2. Kits

   - Jobs in Printing
   - Basic Photography: Parts I and II
   - Basic Photography
   - Shedding Light on Light
   - How Does a Picture Mean?
   - Making Sense Visually
   - Aircraft Mechanic
   - Architectural Drafting
   - Career of an Automechanic
   - A Career in Cabinet Making
   - Careers in Graphic Arts
   - Silkscreening
   - The Electrician Kit
   - The Machinist in the Plastic Moulding Industry
   - Sheet Metal Working is . . .

3. Videorecordings (Career Awareness Resource Library)

   - Carpentry B-2
   - Chemical and Plastics Processing F-1
   - Concrete Finishing B-3
   - Drafting O-4
   - Electrical and Electronic Engineering A-8
   - Electrical Power, Lighting, and Wire Communications B-4
   - Electronic Products Manufacturing G-6
   - General Manufacturing G-8
   - Graphic Arts O-6
   - Insulating and Roofing Occupations B-6
   - Mechanics O-9
   - Metal Machining G-11
   - Metal Products F-4
   - Metal Shaping and Forming G-12
   - Photography D-5
   - Photographic Processing O-13
   - Plastering, Painting and Paper Hanging B-8
   - Printing O-14
   - Rubber and Plastic Products Manufacturing G-14
   - Sheet Metalwork G-15
   - Wood Processing F-2
   - Wood Products Manufacturing G-19

4. Videorecordings and Viewer's Guide (Fast Forward Series)

   - Humanized Technology (Series 1)
   - Implications (Series 2)

The following audio-visual materials, prepared by McKnight Publishing Company, Bloomington, IL, are distributed by Nelson Canada, 1120 Birchmount Road, Scarborough, ON M1K 5G4:

Color Sound - Filmstrips

- Introduction to Printing Process

- Basic Fundamentals of Photo-Offset Lithography
- Fundamentals of Process Photography
- Preparing Camera Copy for Reproduction
- Line Photography--Basic Procedures
- Halftone Photography--Theory and Basic Procedures
- Halftone Photography--Calibration of the Kodak Graphic Arts Exposure Computer
- Making a One-Color Halftone Negative
- Stripping and Platemaking--Basic Procedures
- Paper and Paper Cutting Calculations
- Lithographic Offset Press Fundamentals
- Lithographic Offset Press Cylinder Packing
- Offset Press Makeready

The following audio-visual materials are available from Prentice-Hall Media, 1870 Birchmount Road, Scarborough, ON M1P 2J7:

1. Color Filmstrips, Cassettes, and Program Guide

   a) Graphic Design
      - Creating a Graphic Design
      - Illustrations in Design
      - Display Lettering
      - The Use of Color

   b) The Offset Press Operation
      - Setting up the Press
      - Plating and Inking the Press
      - Make Ready and Register
      - Troubleshooting
      - Cleaning and Maintaining the Press

   c) Finishing Operations
      - Cutting
      - Die Making and Die Cutting
      - Folding Operations
      - Gathering, Sewing, and First Forwarding Operations
      - Case Making, Casing In, and Perfect Binding
      - Mechanical Binding

   d) Safety
      - On Guard!
      - The Safety Program
      - Practicing Safety
      - Protecting Your Eyes
      - Using Hands and Bench Tools
      - Operating Power Machines
      - Preparing for Emergencies
      - Wounds, Sprains, Fractures
      - Shock, Fainting, Burns
      - Artificial Respiration

GRAPHIC COMMUNICATIONS

TEXTBOOK

Broekhuizen, Richard J. Graphic Communications. Bloomington, IL: McKnight Publishing Company, 1973. (Distributed by Nelson Canada.)

REFERENCE BOOKS

Campbell, S. R. The Confident Consumer. South Holland, IL: The Goodheart-Willcox Company, Inc., 1982. (Distributed by General Publishing Company, Ltd.)

Canada Department of Manpower and Immigration. The Canadian Classification of Dictionary of Occupations. Ottawa, ON: The Department, 1971-1973.

----------. Careers Manitoba 1981, Volumes 1, 2, 3, 4. Ottawa, ON: The Department, 1981.

----------. Creating a Career, Instructor's Manual. Ottawa ON: The Department, 1977.

----------. Creating a Career, Student's Book. Ottawa, ON: The Department, 1977.

----------. Training Manual for Canadian Classification and Dictionary of Occupations, Vol. 1. Ottawa, ON: The Department, 1972.

Canada Handbook. Ottawa, ON: Information Division, Statistics Canada, current year.

Canada Yearbook. Ottawa, ON: Information Division, Statistics Canada, current year.

Carlsen, Darvey E. Graphic Arts, 5th ed. Peoria, IL: Chas. A. Bennett Company, Inc., 1975. (Distributed by Copp Clark Pitman.)

Feirer, John L. Drawing and Planning for Industrial Arts. Peoria, IL: Chas. A. Bennett Company, Inc., 1975. (Distributed by Copp Clark Pitman.)

Henderson, Brian L. Exploring Industrial Arts. Scarborough, ON: McGraw-Hill Ryerson, Ltd., 1983.

Hird, Kenneth F. Understanding Graphic Arts. Cincinnati, OH: South-Western Publishing Company, 1982. (Distributed by Gage Publishing, Ltd.)

Jensen, Cecil et al. Drafting Fundamentals, 5th ed. SI Metric. Scarborough, ON: McGraw-Hill Ryerson, Ltd., 1982.

Lathrop, Irvin N. et al. The Basic Book of Photography. Chicago, IL: American Technical Society, 1979. (Distributed by Copp Clark Pitman.)

Laustrup, Jes et al. Exploring Industrial Education, 2nd ed. SI Metric. Scarborough, ON: McGraw-Hill Ryerson, Ltd., 1978.

Manitoba Department of Education. Safety/Health Guide for Industrial Arts, Vocational, Home Economics, and Business Education. Curriculum Support Series. Winnipeg, MB: The Department, 1981.

----------. The Manitoba Career Guide. Winnipeg, MB: The Department, n.d.

Manitoba Trade Directory. Winnipeg, MB: Sanford Evans Publishing, Limited, 1982.

Miller, Wilbur R. et al. Drafting. Bloomington, IL: McKnight Publishing Company, 1978. (Distributed by Nelson Canada.)

Miller, Wilbur R. Graphic Arts. Bloomington, IL: McKnight Publishing Company, 1978. (Distributed by Nelson Canada.)

----------. Photography. Bloomington, IL: McKnight Publishing Company, 1978. (Distributed by Nelson Canada.)

Morrisey, Thomas J. Communication: Drafting. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1976.

Murphy, Terry G. et al. The World of Business: A Canadian Profile. Toronto, ON: Wiley Publishers of Canada, Ltd., 1978.

Ontario Federation of Labour. Occupational Health and Safety: A Training Manual. Toronto, ON: Copp Clark Pitman, 1982.

Ross, Stan. The World of Drafting. Bloomington, IL: McKnight and McKnight Publishing Company, 1971. (Distributed by Nelson Canada.)

Silver, Gerald A. Modern Graphic Arts Paste-Up, 2nd ed. Chicago, IL: American Technical Society, 1973. (Distributed by Copp Clark Pitman.)

Spence, William P. et al. Graphic Reproduction. Peoria, IL: Chas. A. Bennett Company, Inc., 1980. (Distributed by Copp Clark Pitman.)

Swerdlow, Robert M. Introduction to Graphic Arts. Chicago, IL: American Technical Society, 1979. (Distributed by Copp Clark Pitman.)

----------. The Basic Book of Graphic Arts. Chicago, IL: American Technical Society, 1978. (Distributed by Copp Clark Pitman.)

Walker, John R. Exploring Metric Drafting Basic Fundamentals. South Holland, IL: The Goodheart-Willcox Company, Inc., 1980. (Distributed by General Publishing Company, Ltd.)

----------. Graphic Arts Fundamentals. South Holland, IL: The Goodheart-Willcox Company, Inc., 1980. (Distributed by General Publishing Company, Ltd.)

Wallach, Paul I. The Basic Book of Drafting. Chicago, IL: American Technical Society, 1979. (Distributed by Copp Clark Pitman.)

Wood, John C. Looking at the Consumer. Agincourt, ON: Gage Publishing, Ltd., 1981.

AUDIO-VISUAL MATERIALS

The following audio-visual materials, published by DCA Educational Products, Warrington, PA 18976, are available from Administration Information Media (AIM) Educational Aids, P. O. Box 86704, North Vancouver, BC V7L 4L2:

1. Multicolored Transparencies with Overlays

a) Graphic Arts, Group I: What Is Graphic Arts?
- What Is Graphic Arts? (GA-1)
- The Graphic Arts Industry Is (GA-2)
- The Graphic Arts Industry Is (GA-3)
- The Graphic Arts Industry Is (GA-4)

b) Graphic Arts, Group II: Historical Highlights
- Early Graphic Communication (GA-5)
- Egyptian Hieroglyphics (GA-6)
- Comparison of Three Alphabets (GA-7)

c) Graphic Arts, Group III: Design
- Types of Line Illustrations (GA-8)
- Two-Dimensional Design (GA-35)
- Page Proportion (GA-36)
- Balance (GA-37)
- Contrast (GA-38)
- Rhythm (GA-39)
- Unity (GA-40)

d) Graphic Arts, Group IV: Layout
- Enlargements and Reductions: Diagonal Line (GA-9)
- Enlargements and Reductions: Proportional Scale (GA-10)
- Two-Dimensional Layout (GA-41)
- Layout Sequence (GA-42)

  - Thumbnail Sketches (GA-43)
  - Rough Layouts (GA-44)
  - Comprehensive Layout (GA-45)

e) Graphic Arts, Group VII: High Contrast Photography
  - High Contrast Photographic Film (GA-16)
  - A Horizontal Process Camera (GA-17)
  - Enlarging and Reducing with a Process Camera (GA-18)
  - Developing High Contrast Film (GA-19)
  - Photographic Film and Light (GA-56)
  - A Vertical Process Camera (GA-57)
  - Process Camera Focal Length (GA-58)

f) Graphic Arts XII: Finishing and Binding
  - Mechanical Binding Methods (GA-30)
  - Loose-Leaf Binding Methods (GA-31)
  - Wire Staple Binding Methods (GA-32)
  - Sewn Binding Methods (GA-33)
  - Parts of a Book (GA-34)

g) Photography, Group 1: What is Photography?
  - What is Photography? (1)
  - Photography: A Communications Medium (2)
  - Photography: A Career (3)
  - Photography: FUN (4)

h) Photography, Group II: The Camera
  - The Basic Camera (5)
  - Viewfinder Camera (6)
  - Twin Lens Reflex Camera (7)
  - Single Lens Reflex Camera (8)
  - View Camera (9)
  - The Parallax Problem (10)
  - Focusing: 3 Methods (11)
  - The Range Finder Principle (12)

i) Photography, Group III: Exposure Controls
  - Exposure Control Variables (13)
  - Balancing Lens Apertures with Shutter Speeds (14)
  - f-Stop and Exposure Time Comparisons (15)
  - Camera Shutters: Location (16)
  - Shutters: Motion and Light Control (17)
  - Shutter Speed (18)
  - Photoelectric Exposure Meters (19)
  - Photoelectric Exposure Meter Scale (20)
  - Using the Photoelectric Exposure Meter (21)

j) Photography, Group IV: Light and Lenses
  - The Visible Light Spectrum (22)
  - Light Refraction Principle (23)
  - Lenses: Simple and Multiple Elements (24)
  - Circle of Confusion (25)
  - Depth of Field Principle (26)
  - Depth of Field: Two Controlling Principles (27)
  - The f-Number of a Lens (28)
  - Lenses: Types and Relative Speeds (29)
  - Focal Length: Effect on Image Size (30)
  - Lenses: Focal Lengths and Angles of Coverage (35 mm Cameras) (31)
  - Lenses: Focal Lengths and Areas of Coverage (35 mm Cameras) (32)
  - Lenses: Zoom and Fisheye Types (35 mm Cameras) (33)

k) Photography, Group V: Filters (Black and White Photography)
  - The Filter Principle (Panchromatic Film) (34)
  - Common Filters and Characteristics (Panchromatic Film) (35)
  - The Polarizing Filter (36)
  - Filter Factors (37)

l) Photography, Group VI: Film
- Panchromatic Photographic Film (38)
- Photographic Film and Light (39)
- Film Emulsion Ratings (40)
- Processing Roll Film (41)
- Machine Film Processing (42)

m) Photography, Group IX: Composition
- A Good Photograph (59)
- Arrange the Subject: The Rule of Thirds (60)
- Balance: The Key to Good Composition (61)
- Vertical and Horizontal Lines (62)
- Diagonal and S-Curve Lines (63)
- Circular and Zig-Zag Lines (64)
- Framing, Foreground and Horizon Guidelines (65)

n) Photography, Group X: One-Step Photographic Process
- Polaroid-Land Film Pack Camera and Film (66)
- One-Step Photo Principle (Polaroid) (67)
- One-Step Color Reversal Process (Polacolor) (68)
- One-Step Color Reversal Process (Polacolor) B (69)
- The Polaroid SX-70 Land Camera: Cutaway (70)
- The Polaroid SX-70 Land Camera: Optical System (71)
- The Polaroid SX-70 Film Principle (72)

o) Photography, Group XI: Color
- Additive Process (73)
- Subtractive Process (74)
- Reproduction of Colors by the Color Negative System (75)
- Reproduction of Colors by the Reversal Color Film (Ektachrome) (76)
- Reversal Color Film Processing Concept (77)
- Color Temperature (78)

The following audio-visual materials are available from Library, Manitoba Department of Education, 1181 Portage Avenue, Winnipeg, MB R3G 0T3:

1. 16 mm Film

- Blue Sky Thinking (color)
- If I Had a Hammer (color)
- Drawing and Planning (color)
- Working Safely in the Shop (black and white)

2. Kits

- Jobs in Printing
- Basic Photography: Parts I and II
- Basic Photography
- Shedding Light on Light
- How Does a Picture Mean?
- Making Sense Visually
- Aircraft Mechanic
- Architectural Drafting
- Career of an Automechanic
- A Career in Cabinet Making
- Careers in Graphic Arts
- Silkscreening
- The Electrician Kit
- The Machinist in the Plastic Moulding Industry
- Sheet Metal Working is . . .

3. Videorecordings (Career Awareness Resource Library)

- Carpentry B-2
- Chemical and Plastics Processing F-1
- Concrete Finishing B-3
- Drafting O-4

- Electrical and Electronic Engineering A-8
- Electrical Power, Lighting, and Wire Communications B-4
- Electronic Products Manufacturing G-6
- Graphic Arts O-6
- Insulating and Roofing Occupations B-6
- Mechanics O-9
- Metal Machining G-11
- Metal Products F-4
- Metal Shaping and Forming G-12
- Photography D-5
- Photographic Processing O-13
- Plastering, Painting and Paper Hanging B-8
- Printing O-14
- Rubber and Plastic Products Manufacturing G-14
- Sheet Metalwork G-15
- Wood Processing F-2
- Wood Products Manufacturing G-19

4. Videorecordings and Viewer's Guide (Fast Forward Series)

- Humanized Technology (Series 1)
- Implications (Series 2)

The following audio-visual materials, prepared by McKnight Publishing Company, Bloomington, IL, are distributed by Nelson Canada, 1120 Birchmount Road, Scarborough, ON M1K 5G4:

Color Sound - Filmstrips

- Introduction to Printing Process
- Basic Fundamentals of Photo-Offset Lithography
- Fundamentals of Process Photography
- Preparing Camera Copy for Reproduction
- Line Photography--Basic Procedures
- Halftone Photography--Theory and Basic Procedures
- Halftone Photography--Calibration of the Kodak Graphic Arts Exposure Computer
- Making a One-Color Halftone Negative
- Stripping and Platemaking--Basic Procedures
- Paper and Paper Cutting Calculations
- Lithographic Offset Press Fundamentals
- Lithographic Offset Press Cylinder Packing
- Offset Press Makeready

The following audio-visual materials are available from Prentice-Hall Media, 1870 Birchmount Road, Scarborough. ON M1P 2J7:

1. Color Filmstrips, Cassettes, and Program Guide

a) Graphic Design
   - Creating a Graphic Design
   - Illustrations in Design
   - Display Lettering
   - The Use of Color

b) The Offset Press Operation
   - Setting up the Press
   - Plating and Inking the Press
   - Make Ready and Register
   - Troubleshooting
   - Cleaning and Maintaining the Press

c) Finishing Operations
   - Cutting
   - Die Making and Die Cutting
   - Folding Operations
   - Gathering, Sewing, and First Forwarding Operations
   - Case Making, Casing In, and Perfect Binding
   - Mechanical Binding

d) Safety
   - On Guard!
   - The Safety Program
   - Practicing Safety

Modern School Shop Planning. Ann Arbor, MI: Prakken Publications, Inc., 1971.

Organization and Administration Forms for Industrial Arts, Series 1000. Kennedy, MN: Instructional Materials Service, n.d.

Palomaki, Mary Jane, ed. Teaching Handicapped Students Vocational Education. Reston, VA: National Education Association, 1981.

Roberts, Roy W. Vocational and Practical Arts Education. New York, NY: Harper and Row Publishers, Inc., 1971.

Sarkees, Michelle Donnelly et al. Vocational Special Needs: Preparing TE and I Teachers. Alsip, IL: American Technical Publications, Inc., 1982.

Silvius, C. Harold and Estell H. Curry. Managing Multiple Activities in Industrial Education. Bloomington, IL: McKnight and McKnight Publishing Company, 1971.

Wilber, Gordon O. and Norman C. Pendered. Industrial Arts in General Education, 4th ed. New York, NY: Intext Educational Publishers, 1973.

PERIODICALS

Canadian Vocational Journal. Canadian Vocational Association, Suite 608, 251 Bank Street, Ottawa, ON K2P 1X3. (quarterly)

Careers. Reed Career Service, Suite 800, 4445 Calgary Trail South, Edmonton, AB T6H 5C3.

Design Graphics World. Communications Channels, Inc., 6255 Barfield Road, Atlanta, GA 30328.

Industrial Education. Harcourt Brace Jovanovich Publications, 757 Third Avenue, New York, NY 10017. (monthly)

Man/Society/Technology (formerly Journal of Industrial Arts Education), American Industrial Arts Association, Inc., 1914 Association Drive, Reston, VA 22091. (monthly)

National Safety News. National Safety Council, 444 N. Michigan Avenue, Chicago, IL 60611.

School Shop. Prakken Publications, Inc., 416 Longshore Drive, P. O. Box 8623, Ann Arbor, MI 48107. (monthly)

VocEd (formerly American Vocational Journal), American Vocational Association, 2020 N 14th Street, Arlington, VA 22201. (monthly)

- Protecting Your Eyes
- Using Hands and Bench Tools
- Operating Power Machines
- Preparing for Emergencies
- Wounds, Sprains, Fractures
- Shock, Fainting, Burns
- Artificial Respiration

The following audio-visual materials are available from Canadian Kodak Company, Limited, 3500 Eglinton Avenue, West, Toronto, ON M6M 1V3:

Slides and Tapes

- Basic Black and White Printing
- Advanced Black and White Printing
- Processing Black and White Film
- Basic Photo Composition
- Film How It Works

DRAFTING, GRAPHIC ARTS, GRAPHIC COMMUNICATIONS

PROFESSIONAL BOOKS

American Council of Industrial Arts Supervisors. Guidance in Industrial Arts Education for the '70s. Washington, DC: American Industrial Arts Association, 1971.

----------. Industrial Arts in the Middle School. Washington, DC: American Industrial Arts Association, 1971.

American Council on Industrial Arts Teacher Education. Yearbooks 1-31. Bloomington, IL: McKnight and McKnight Publishing Co., 1951-present. (Published yearly.)

American Industrial Arts Association. Industrial Arts Standards and Handbook. Reston, VA: American Industrial Arts Association Inc., 1982.

Butler, F. Coit. Instructional Systems Development for Vocational and Technical Training. Englewood Cliffs, NJ: Educational Technology Publications, Inc., 1972.

Henck, Richard M. Lesson Planning for Meaningful Variety in Teaching. Washington, DC: National Education Association of the United States, 1980.

Hoots, Jr., William R., ed. Industrial Arts in the Elementary School: Education in a Changing Society. Greenville, NC: East Carolina University, 1971.

Householder, Daniel L. Review and Evaluation of Curriculum Development in Industrial Arts Education. Bloomington, IL: McKnight Publishing Company, 1972.

Larson, Milton E. Teaching Related Subjects in Trade and Industrial and Technical Education. Columbus, OH: Charles E. Merrill Publishing Company, 1972.

Leighbody, Gerald B. and Donald M. Kidd. Methods of Teaching Shop and Technical Subjects. Albany, NY: Delmar Publishers, Inc., 1966.

Lindbeck, John R. Practical Guide to Industrial Arts Education. New York, NY: The Center for Applied Research in Education, Inc., 1972.

Maley, Donald A. The Industrial Arts Teacher's Handbook Techniques, Principles, and Methods. Boston, MA: Allyn and Bacon, Inc., 1978.